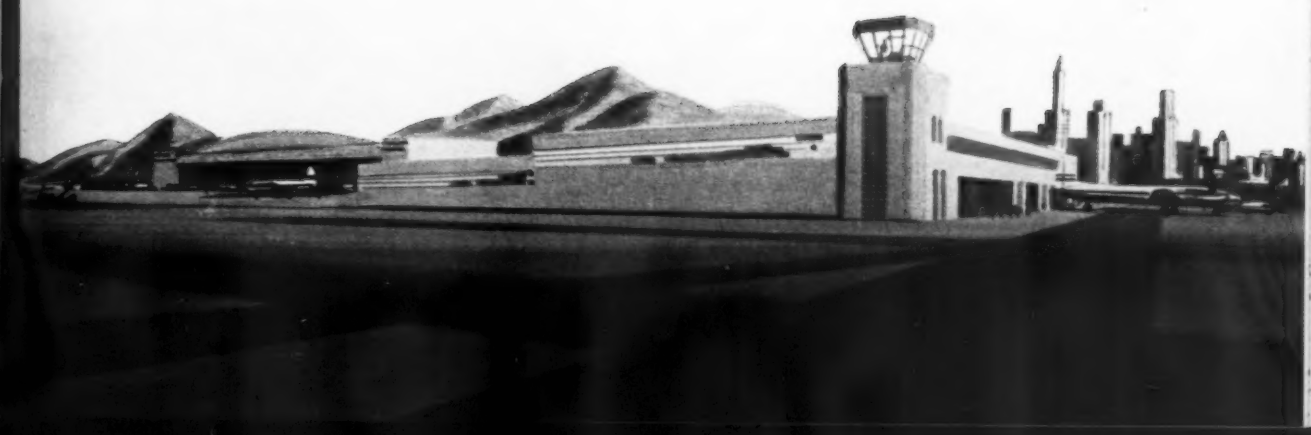
MODEL AIRPLANE NEWS

MAY 1948 • 25 CENTS

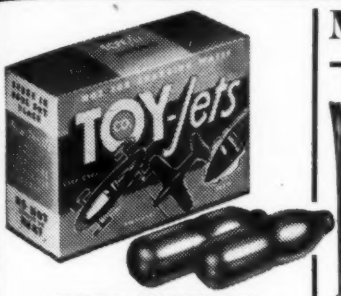
DOUGLAS DC-6



"They can't agree on which Testor's Model Airplane Cement Formula they ought to use!"

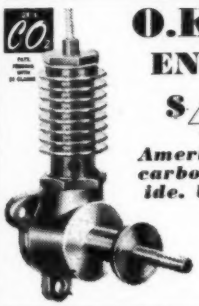
There's no argument about Testor's Model Airplane Cements being *best* . . . it's just a matter of personal preference as to whether you want Formula A for *super speedy drying* or Formula B for *medium fast drying.* Formula A dries crystal clear *almost instantly* . . . is amply strong for balsa wood. Formula B is desirable for *all* materials including hardwood and metal; is unsurpassed for strength; also dries crystal clear. Testor's cements have gained nation-wide recognition for their superior quality in both flying and scale model construction work. At your own work bench or on the flight line, you'll want Testor's! See your dealer . . .

TESTOR CHEMICAL COMPANY • ROCKFORD, ILLINOIS



JET BULBS

Specially made, with extra heavy charge for jet race cars, planes and boats.
Box of 10 ..... **$1.00**



O.K. CO_2 ENGINE

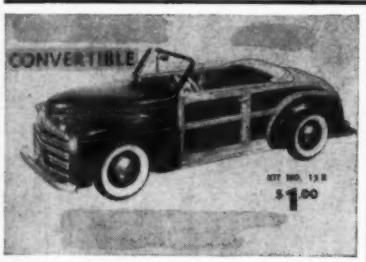
$4.95

America's only carbon - dioxide. Uses Toy Jets for power.

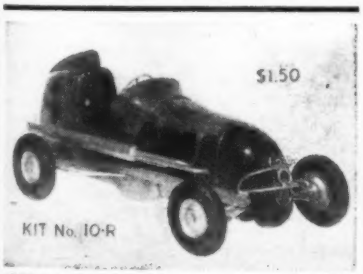
KITS for CO_2 Motor

Lancer	$1.00
Thermalier	$1.00
Topper A	$1.00
Circle King	$1.00
Fleetster	$1.25
Powerhouse	$1.50

Add 15c postage

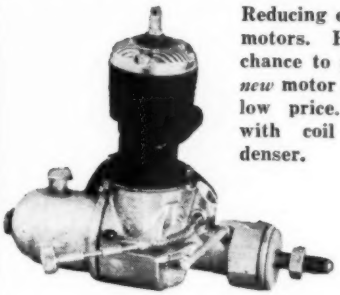


Convertible $1.00
plus 15c postage



Midget Race Car $1.50
plus 15c postage

MOTOR CLEARANCE!



Reducing our stock of motors. Here's your chance to get a *brand new* motor at a special low price. Complete with coil and condenser.

	Was	Now
Bullet	$12.75	$ 9.95
Cannon 330	19.75	13.50
Fleetwind	24.75	15.50
Hurricane	19.50	9.95
Merlin	21.50	10.95
Pacemaker	24.95	14.95
Rocket	22.50	15.00
Rogers 29	15.75	8.95
Rogers 35	16.75	9.95
Rogers Ram	10.95	7.95
Wensen	20.00	12.50
Vivell 35	18.00	12.50
Vivell 49	20.00	13.50

VIBRA-TAK PRECISION TACHOMETER

Checks the efficiency of all engines by giving direct, instant readings from 2,000 to 15,000 RPM **$2.00**

HAWKER SUPER FURY

24" Wingspan, ¼" scale. For .09 to .23 engines. "U" Control Elevator and "Autotrol" Rudder **$2.50**

DRONE

National Champ Diesel Engine

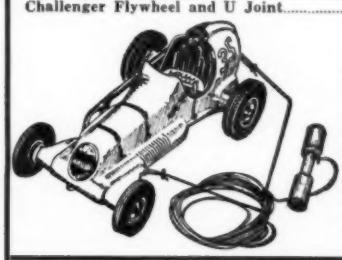
Out of the carton, ready to run. At a new low price **$14.95**

THIMBLEDROME RACER

$3.95

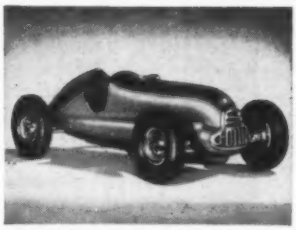
Can be gas or CO-2 engine powered, by purchasing one of the conversion units below.

Kar Kit No. 1, for Ohlsson 19 or 23	$6.25
CO-2 Conversion Unit	$2.00
Challenger Differential	$6.95
Challenger Flywheel and U Joint	$1.95



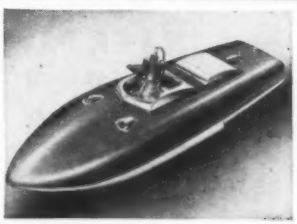
The Challenger differential has been especially designed for small racing cars. It is precision machined from Dural with steel gears and bronze bearings.

We can fill all your model and accessory needs from our unusually large stock. You can order any item advertised in this magazine from us. Immediate delivery.



RUEHL RACE CAR

Fiberglas molded-body, ball-bearing wheels and drive. For Cable or rail **$24.95**



RUEHL HYDROPLANE

Class "D" Bakelite model hydroplane. Complete with all fittings **$15.00**

MODEL KITS

Buckboard	$1.00
S R Race Car	$ .60
Comet Hi Power	1.00
Sport Roadster	.60
Civilian Jeep	.60
Stage Coach	1.50
Covered Wagon	1.50
Horseless Carriage	1.50
Veco Racer	.95
Cavacraft	.60
Ace Racer	.35
Railway Express Truck	4.95
Ting Trucks	.75
Bulldozer	1.00
Army Searchlight	1.00

JET RACECARS

Comet Racer	$ .50
Jet Midget	.60
Hot Shot	.60
Jeto	.60
Jet Speedboat	.60
Atomic	1.00
Terrajet	1.00
Hot Rod	1.00
Hot Rok	1.00
Midjet	.85
Monojet	.85
Cannon Ball	.60
Flash Rocket Plane	.75
Supersonic Streak	.75
Gadjet Plain	1.00
Gadjet Painted	1.50
Rocket Jet Plane	1.00

SOLID WOOD MODEL KITS

Add 15c postage

ROCK ISLAND ROCKET

Fits standard HO gauge model layouts. Scale ⅛" to 1'. Complete kit with instructions $1.59
Power trucks can be added to operate as electric train!

DEWITT CLINTON

(as illustrated)	$ .50
DeLuxe Model	$1.00
William Galloway	$ .50
DeLuxe Model	$1.00

On C.O.D. orders, please send 25% with order

ACE MODEL AIRPLANE COMPANY

"The Country's Oldest Hobby House"

3149 Shenandoah - - - - - - - - - - ST. LOUIS 4, MISSOURI

MODEL AIRPLANE NEWS

JAY P. CLEVELAND
Publisher

Serving Aviation 19 Years

MAY 1948 VOL. XXXVIII No. 5

CONTENTS

Cover Design by Jo Kotula

CONTROL LINE SCALE

Loening Amphibian 9

FLYING SCALE RUBBER

SE 4 Racer 23

MOTOR CONSTRUCTION

Build Your Own Diesel 18

WYLAM MASTERPLAN

Pfalz D12 26

PLANE ON THE COVER

Douglas DC6 17

SCIENCE

Design Forum 13
Miniature Pulse Jets 14
Wing Tips and Taper 20
Easy Airfoils 22
The New Look in Models 28
Fuel for Diesels 32

WORLD WAR I

Breguet Biplane (Part 2) 27

3 VIEW

Douglas DC-6 16

NEWS

Flash 2
The Scrap Box 8
Air Ways 30
1948 Nationals 30
West Coast Tips 34
News of Modelers 65
Club News 66

HOWARD G. McENTEE ..... Editor
JOSEPH M. MANN ..... Managing Editor
WILLIAM A. WYLAM ..... Associate Editor
WITTICH HOLLOWAY ..... Art Director
JAY P. CLEVELAND ..... Adv. Manager
A. M. HOFFMAN ..... Asst. Adv. Manager

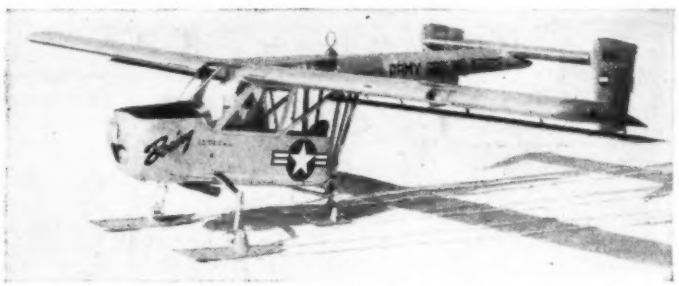
Advertising Representative. WEST COAST: Justin Hannon, 5429 Crenshaw Blvd., Los Angeles 43, Calif.

Published monthly by Air Age, Inc., Mount Morris, Illinois. Editorial and Advertising offices: 551 Fifth Ave., New York 17. Jay P. Cleveland, President and Treasurer; A. M. Hoffman, Sec'y. Entered as second class matter Dec. 6, 1934 at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y. Price 25c per copy. Subscriptions $2.50 per year in the United States. $3.00 in Canada. All other countries $3.50.

Copyright 1948 by Air Age, Inc.

THE DEATH of Orville Wright, co-inventor of the airplane, on January 23 at 10:40 p.m. at Dayton, Ohio severed man's last link with the birth of an new era: the Air Age. At the age of 76 Orville Wright joined his equally famed brother Wilbur in ageless history as one of the few classic inventors of human record. Orville was the first man to make a powered flight (on Dec. 17, 1903) and the frail biplane in which he set man free from land and sea is coming back home to the land of its birth in accordance with Orville's wishes. The machine has been in the South Kensington (London) Science Museum since 1928, when Orville shipped it there in his memorable controversy with the U.S. Smithsonian Institution over the claims of Prof. S. P. Langley. Following public apology by the Smithsonian, Orville withdrew his objection to his plane's return but made no specific attempts towards setting a date. At first it was believed he had refused its return when his will failed to mention it, but among his personal effects was found a letter expressing his wish that it be returned. His two nephews, Harold S. Miller and Harold W. Steeper, coexecutors of his estate, have announced their intention of bringing this about. It will be placed in the new National Air Museum in Washington, D.C. upon completion of planned facilities. Meanwhile, students of the DeHavilland Technical School have completed an exact replica to take its place in the British museum. Significantly, only a few weeks before he died Orville read of man's first piloted flight at supersonic speed, his life span having linked man from an earthbound existence to speed faster than sound.

ALTHOUGH LIGHTLY USED throughout the past 4 decades, the term "inventive genius" applied to the Wright Brothers was a more accurate description than a dramatic accolade, for now, after Orville's passing, it is possible to reveal some of his work in his secret Dayton laboratory. Orville invented an automatic airplane stabilizer, for which he received the 1913 Collier Trophy, the first split type flap, an early fully retractable landing gear, and an early fully enclosed engine cowling. In addition, Orville invented an automatic phonograph record changer, still unlike anything yet on the market, and an automatic decoding machine capable of deciphering over a million different code combinations.



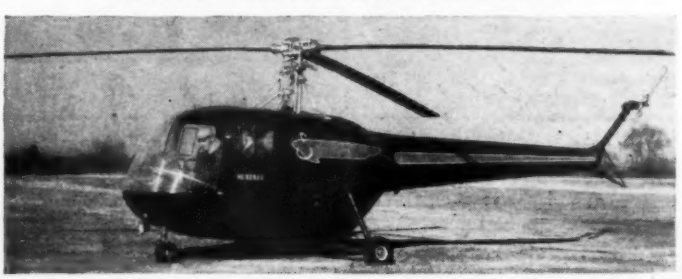
Practically airtight cabin and auxiliary heating system are some of the features that allow operation of this Boeing XL-15 in temperatures of minus 65 degrees

U.S. AIR FORCE has completed plans for its 1948 fiscal year transport production with orders drawn up for 10 Douglas DC-6 (C-118), 10 Lockheed *Constellation* (C-69), and 24 Northrop *Pioneer* (C-120) transports. Each of the craft will be especially designed to do a different transportation job for the AF but all will have a basic air cargo version. Many observers see in these orders—in addition to AF need for high performance transport aircraft—a desire to maintain reasonable level of production on these types until July 1, 1948 when the new and greatly expanded fiscal 1949 funds become available. Still unannounced is Republic's order for 20 *Rainbow* F-11 long range photo-reconnaissance craft.

NAVY BUREAU OF AERONAUTICS procurement for fiscal 1949 is already substantially planned with Grumman F8F *Bearcat*, Douglas AD *Skyraider*, Lockheed P2V *Neptune* and Martin PBM-5a amphib-

(*Turn to page* 71)

Sikorsky S-52 two place helicopter features all-metal rotor blades and has CAA license for day or night commercial use



An Outstanding Buy in Fine Engines

LATE last fall, Ohlsson & Rice, Inc., purchased the remaining stock of finished engines and parts of the Dennymite Airstream.

Pacific Airmotive Corp., manufacturers of this engine for many years, had decided to retire from the engine business.

As every old-time gas modeler will remember, the Dennymite is a high quality engine with plenty of power, stamina, and dependability.

Knowing there would be a shortage of good engines at reasonable prices for the Christmas demand, Ohlsson & Rice endeavored to "fill the gap" by making these Dennymites available at an exceptionally low price.

Simultaneous with the announcement to dealers, we made arrangements with a reliable Repair organization to maintain service on the engines. This means that no modeler who bought one of these Dennymites has an orphan. There is an ample supply of parts to keep all the engines we purchased in top operating condition.

Now as to the price: Before the war the Dennymite sold at $17.85. Thousands were bought by modelers at this price. After the war, with advancing labor and material costs, the same engines sold for $22.95.

While they last—and there is only a limited supply left—the engines are offered at $6.95. This is actually much less than the pre-war *wholesale* price. If you are still debating before laying out money for an engine, here is your opportunity — a buying opportunity in fine engines that we do not believe will ever be surpassed.

Your dealer can supply you, or if there is not a dealer in your locality, we will ship on receipt of money order.

$6.95

with coil and condenser **$7.95**

DEALERS: Most Jobbers in the country have Dennymites, but if you cannot obtain a stock from your Jobber, write us giving his name.

Dennymite Airstream

Ohlsson & Rice

EMERY AT GRANDE VISTA • LOS ANGELES 23, CALIFORNIA

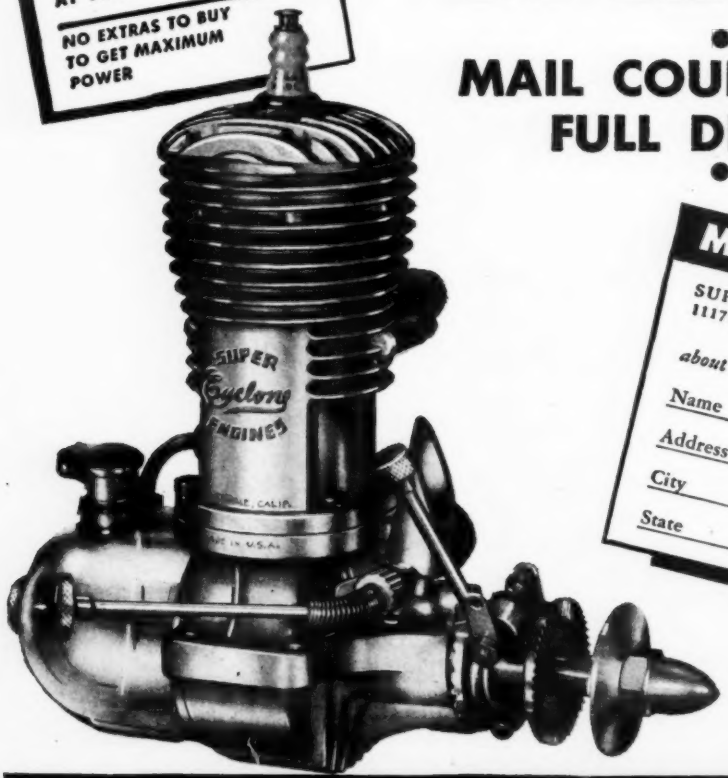
$2400 IN CASH PRIZES

...be A WINNER with SUPER-CYCLONE

NOW ONLY $18.95

AT YOUR FAVORITE DEALER

NO EXTRAS TO BUY TO GET MAXIMUM POWER



MAIL COUPON FOR FULL DETAILS

MAIL COUPON TODAY

SUPER-CYCLONE, INC., Grand Central Air Terminal
1117 Airway, Glendale 1, California

Please send me free catalog and full details about $2400 cash awards.

Name

Address

City

State Zone

Age N

SUPER-CYCLONE, INC.
GRAND CENTRAL AIR TERMINAL
1117 AIRWAY— GLENDALE 1, CALIFORNIA

SUPER-CYCLONE—THE BIGGEST NAME IN LITTLE ENGINES

Keep Ahead....

TRAIN FOR AN

AVIATION CAREER

IN SUNNY SOUTHERN CALIFORNIA

AERONAUTICAL ENGINEERING
MASTER AVIATION MECHANICS

(NO FLYING INVOLVED)

NEW STUDENTS MAY ENTER IMMEDIATELY—BOARD AND ROOM NOW AVAILABLE

MAXIMUM TRAINING IN MINIMUM TIME

Using modern training equipment, including jets, the courses are intensive, highly concentrated, complete and C.A.A. approved, with all non-essentials eliminated. Leadership training is stressed... Upon graduation you will be an *aviation expert and fully qualified to hold a remunerative and responsible position in the aircraft industry, forge ahead steadily and add more dollars to your pay check*... Established in 1929 "Cal-Aero" is one of the oldest, largest and most distinguished aeronautical schools in the world. It is located on its own famous airport... Grand Central Air Terminal, in the Los Angeles-Hollywood Metropolitan area, in Glendale—the heart of Southern California's giant aircraft industry, "Cal-Aero" has over 7,000 successful civilian graduates in addition to more than 26,000 pilots and 7,500 aviation mechanics trained for U.S. Army and Navy Air Forces.

WE HAVE THE EXPERIENCE—THERE IS NO SUBSTITUTE FOR IT

Cal-Aero has solved the housing problem! Board, room and transportation is now available right here on Grand Central Air Terminal.

APPROVED FOR VETERANS

TRAIN IN SUNNY SOUTHERN CALIFORNIA

MAIL TODAY—DON'T DELAY

BE WISE...PROTECT YOUR FUTURE

EST. 1929

CAL-AERO TECHNICAL INSTITUTE

Alis Et Animo

GRAND CENTRAL AIR TERMINAL

GLENDALE 1, (Los Angeles County) CALIFORNIA

CAL-AERO TECHNICAL INSTITUTE N-5

GRAND CENTRAL AIR TERMINAL, GLENDALE 1, CALIFORNIA

Send full information and catalog, free and without obligation, on courses checked below:

CAREER COURSES

- ☐ AERONAUTICAL ENGINEERING
- ☐ MASTER AVIATION MECHANICS

HOME STUDY COURSES

- ☐ HOME STUDY— *AERONAUTICAL DRAFTING*
- ☐ HOME STUDY— *AIRCRAFT BLUEPRINT READING*
- ☐ HOME STUDY— *STRESS ANALYSIS AND DESIGN*

Name _____

Address _____

City _____ Zone _____

State _____ Birth date _____

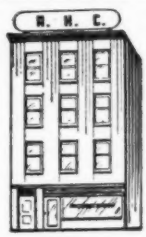
Check one: ☐ Veteran ☐ Non-Veteran

ESTABLISHED 1931

A generation of mail order business guarantees our service and your satisfaction. Our business depends on pleasing you. Your mail order business should be sent to us because:

LARGEST HOBBY MAIL ORDER FIRM IN AMERICA 1948

1. *14-Day Money Back guarantee on unused purchases.*
2. Unused purchases exchangable.
3. No postage or packing charges—we insure safe delivery.
4. 24 hour service—no waiting. New York, Chicago and San Francisco addresses to serve you faster.
5. Most complete gas model stock in America.
6. Competent understanding of your modeling problems.
7. No "minimum" orders. Any order is welcome.
8. *FREE* Coil, condenser, etc., etc., with gas motors. 29 items worth over $7.00 at no extra cost.
9. *FREE* sponge wheels, knife, etc., etc., with every plane. 12 items worth $3.50 at no extra cost.
10. *FREE* membership in "Modelcrafters of America," the club that keeps you up to date on gas modeling and SAVES YOU MONEY ON YOUR PURCHASES.
11. *FREE* illustrated 24 page catalog with every order.
12. We don't carry everything—*ONLY THE BEST.* If it's advertised, we can supply it.



Our own four story building to serve you in N. Y. C. Drop in for a visit.

FREE! FREE!
with Gas Motors:

1. Quality Coil
2. Everlast Condenser
3. 3-way plug wrench
4. Hi-tension wire
5. Stranded ignition wire
6. Insulated coil holder
7. Correct size prop
8. Presto engine starter
9. Complete instructions
10. Plug gauge set
11. Battery box
12. Slide switch
13. 50 page engine manual
14. 4 mounting bolts
15. 4 mounting nuts
16. 4 wiring lugs
17. Spark Plug
18. Identification tags
19. Motor cover
20. Speed indicator
21. Log book
22. Trouble shooting chart
23. No. 70 oil
24. Membership in Modelcrafters of America
25. Postage
26. Packing
27. Insurance
28. A.H.C. Guaranty
29. 48 page giant catalog

FREE! FREE!
with Planes:

1. Correct rubber wheels
2. Pro all-metal knife
3. 150 page construction manual
4. Speed Indicator
5. Log book
6. Complete full size plans
7. Insignia
8. Membership in Modelcrafters of America
9. 48 page catalog
10. Postage
11. Packing
12. Insurance

MOTOR ACCESSORIES

Battery Box (all sizes)	$ .40
Megow Plastic (pen or med.)	.40
Aero Coil (Featherweight)	2.50
Aero Coil (Quality)	3.00
Smith Competitor Coil	1.95
Arden Coil	2.50
Winston Coil	2.00
Wilco Coil	1.95
Regular Coil	1.50
Metal Condenser	.45
Paper Condenser	.20
Ignition Wire (6 feet)	.25
Glow Plug	.85
Spark Plugs (all sizes)	.50
Arden Booster Jack	1.25
Switch	.30
Vitamite Flight Battery	2.35
Vitamite Booster Batt.	5.00
Flight Battery	2.75
Booster Battery	3.50
House Charger	4.45
Auto Charger	1.95
Arden Flight Timer	1.85
Austin Flight Timer	1.50
Comet Flight Timer	1.00
Hillcrest Flight Timer	1.25
Universal Needle Valve	.50
3-Way Plug Wrench	.15
Neoprene Tubing (per ft.)	.30
Spinit Starter	5.00
Alum. Engine Mounts	.30 & .50
Flo-Torque Props	
8" to 14" .35, 15"	.50
16" to 18"	.75
Hi-Ball 9" to 14"	.50
Hi-Pitch Props: 9", 10", 45c; 12", 13", 60c; 14", 65c.	
Topping 3 Bl. Plastic Props	1.50
Sponge Rubber Wheels 2", 40c; 2 1/2", 50c; 3 1/2", 60c.	
Trexler Balloon Wheels: 2 1/2", 60c; 2 3/4", $1.00; 3", $1.25; 3 1/2", $1.50; 4 1/2", $1.75.	
Spray Gun $1.25	1.75
Modelers Plane	.75
Flywheels A or B, $1.00; C, $1.50	
Univ. Running Stand	1.50
Wright Test Block $4.95 and	9.50
Jem Pump Can	.75
Presto Disc Starter	.25
Wood Stripper	.25
Austin Tank	.50
Froom Gas Tank	1.00
Maeco Tank	1.25

FREE FLIGHT PLANES

For "A" & "B" Motors

Coronet 46"	$2.50
Buccaneer 48"	3.50
Bee 48"	1.95
Brooklyn Dodger 56"	3.95
Pacer B 53"	3.95
Topper 41"	3.50
Roamer 45"	2.95
Zombie 44"	2.50
Rocketeer 40"	2.95
Playboy Jr. 55"	3.25
Bucaneer B Spl. 54"	3.95
Amer. Ace 54"	3.95
Banshee Std. 50"	2.00
Wanderer 54"	3.50
Bay Ridge Mike 49"	2.00
Zipper 54"	5.95
Runt 44"	2.50
Air Foiler 44"	3.95
Zipper "A" 32"	1.95
Pixie "A" 42"	1.95
Musketeer 54"	3.50
Amer. Ace 36"	1.50
Stanzel Interceptor 51"	2.98
Skyrocket 36"	2.95
Ranger 46"	2.50
Comet Interceptor 42"	3.95
Musketeer 42"	2.50
Brigadier 58"	2.95
Yogi 42"	3.95
Jersey Javelin 48"	3.95
Larkey 50"	3.50
Mercury Jr. 50"	3.95
Good News 50"	3.95
Powerhouse 56"	4.95
Powerhouse 41"	3.95
Silvaire 43"	3.00
Megow Piper Cub 53"	4.50
Ensign 30"	3.50
Crusader 48"	7.50
Humdinger 52"	3.95

For "C" & "D" Motors

Piper Super Cruiser 84"	$10.95
Pacer "C" 60"	4.95
Buccaneer Std. 66"	5.95
Buccaneer C Spl. 72"	6.95
Super Buccaneer 90"	9.95
Mercury 72"	5.50
Playboy Sr. 70"	6.00
Stinson Reliant 78"	17.50
Musketeer Std. 72"	4.95
Cavalier 60"	5.95
Wog 60"	4.95
Vagabond 74"	5.50
Custom Cavalier 108"	17.50
Sailplane 78"	8.95
Spearhead Sr. 60"	3.95
Skybo 66"	6.95
Super Quaker 76"	7.00
Skybuggy Biplane 42"	5.95
Powerhouse 62"	5.95

CONTROL-LINE PLANES

Capitol Ercoupe 40" B-C	$ 7.50
Duraplane 26" B-C	12.50
Topping 21" B-C	10.00
Snafu Ercoupe 45" C	12.50
Fireball 36" B-C	7.95
Controliners by Berkeley	
P47 41" C	5.95
P51 37" A-B	7.95
Bearcat 35 1/2" C	5.95
Navion 25 1/4" A	3.95
Super Fury 24" A-B	2.50
Super Zlich 52" C	4.95
Lil' Zlich 36" B-C	2.95
Buster 24" B-C	2.50
Bat 32" C	4.95
Bat 24" B	3.95
Bug 17" A	2.95
Tiger Shark 36" C	4.95
Super V Shark 24" B-C	4.95
Tarpon 28" B-C	10.75
P. D. Q. 24" B	5.00
Piper Skycycle 30" B-C	7.50
Falcon Speedster 25" B-C	3.95
Tether Streak 22" C	3.50
Dreamer 20" B-C	7.50
Vee-Gee 18" B-C	10.00
Scale-Liners by Eagle:	
P51H Mustang 29" B-C	4.95
F6F4 Hellcat 42" B-C	4.95
Thunderbolt 42" B-C	4.95
Navion 34" B-C	6.50
Capitol 400 24" B-C	4.95
Trail Blazer 24" B-C	2.95
Mercury U.C. 72" C	7.50
Perky 19" A	2.00
Streamliner 25" B-C	4.00
Competitor 28" C	5.50
Cyclone 36" B-C	4.95
Whizzer 30" B-C	7.50
Falcon Sportster 25" B-C	3.95
Baby V Shark 20" A-B	2.95
Miss Behave 34" B-C	3.95
Zing 24" B-C	4.95
Dronette 35" B	3.50
Cadet 33" A-B	3.95
Stardust 26" B	10.00
Atomic 14 1/2" B	3.50
Capital Navion 40" B-C	7.50
Presto-Liner 20" A-B	5.95
Beechcraft 40" B-C	9.95
Tyro 26" B-C	3.50
Flicker 24" A-B	3.95
Stunt Ace 40" A-B-C	3.50
Whirlwind Sr. 30" B-C	7.50
Whirlwind Jr. 19" A	2.95
Topper III 20" B-C	3.00
Gee-Bee 15" A	2.95
Hot Rock 38" B-C	3.50
Skystreak 16" A	1.95
Bantam Spl. 17" A-B	2.75
Shark G-5 30" B-C	4.95
Sharkadet 30" B-C	3.95
Wildfire 23""B-C	2.50
Rookie Trainer 36" B-C	3.95

U-CONTROL ACCESSORIES

100' Stranded Speed Wire	$ 1.95
140' Stainless Steel Wire, 50c; 100', 40c.	
Perrycraft Swivel Tank	2.00
Jem Control handle-pistol grip	2.50
Wood "Gun" Control Handle & Reel	2.85
Metal Control Handles	1.25
Wood Control Reel 5 1/2" diam.	1.25
U-Reely Control	7.50
U-Reely Remote	12.50
Sullivan Accessory Kit	1.25
Snafu Accessory Kit	1.00
Thum-It Handle	1.95
Elev. Control-It	1.95

FLOAT KITS

Type 20 40" to 50" span planes	$1.00
Type 30 up to 80" span planes	1.50
Type 40 over 80" span planes	2.50

GAS BOOKS

Gas Modelers Guide	$1.00
Gas Engine Handbook	1.00
Model Plane Construction	1.00
Control-Liners	1.00
Model Airplane Design	3.75
Building & Flying Model Airplanes	2.00
Model Gas Engines	2.50
Model Aircraft Handbook	2.50
Gas Models & Engines	3.00
Model Motor Manual	3.00
Air Age, 21 Models	2.00

RACE CARS

McCoy Proto, Invader or Hot Rod	$42.50
Dooling	45.00
Reuhl	24.95

Also Complete Line of Parts and Accessories.

GAS BOATS

Dolphin 21" A-B	$ 6.50
Commando 20" A-B	5.95
Sea Bird 24" B-C	4.95
Marlin 26" C	7.50
Reuhl 26" B-C	15.00
O-Gee 28" C	5.95
O-Gee (Built-up hull)	10.95
Hardware for Sea Bird	2.95
Hardware for O-Gee	4.95

Also Complete Line of Boat Accessories.

SPECIAL! BARGAIN!

COMPLETE FLYING OUTFITS

CHOICE OF U-CONTROL OR FREE-FLIGHT

$10.00 CHOICE OF GENIE OR JUDCO ENGINE

35 ITEMS WORTH OVER $20.00 **AT HALF PRICE**

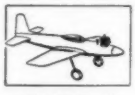
$12.50 CHOICE OF OHLSSON OR THOR ENGINE

HERE IS WHAT YOU GET:

1. Your own choice of 4 well-known engines.
2. Your own choice of either U-Control Skystreak plane (precarved fuselage), wings, A. J. Walker Patents, (easy to build and fly) or 50. free-flight Banshee plane.
3. Wilco coil.
4. Condenser.
5. Hi-tension wire.
6. Insulated ignition wire.
* 7. U-control wire.
8. Rubber wheels.
9. Formed landing gear.
10. Correct propeller.
11. Cement.
*12. Control handle.
13. Ignition switch.
14. Battery box.
15. Spark Plug wrench.
16. Champion Spark plug.
*17. Bell crank.
18. 4 Mounting bolts.
19. Wiring lugs.
20. Speed indicator.
21. Presto engine starter.
22. Plug gauge set.
23. Motor cover.
24. 50 page book: Gas Engine Theory.
25. 150 page Control-liner book.
26. Insignia.
27. Flight log.
28. Complete engine instructions.
29. Complete plans for building plane.
30. "Pro" all-metal knife.
31. No. 70 oil.
32. Coil holder.
33. Bubble canopy.
34. Sandpaper.
35. Membership in Modelcrafters of America.
36. 4 mounting nuts.
37. Postage.
38. Packing.
39. Insurance.
40. 24 page giant catalog.
41. Motor trouble shooting chart.

* INCLUDED IN U-CONTROL ONLY.

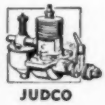
WHAT MORE CAN YOU NEED!



SKYSTREAK

BANSHEE

GENIE



JUDCO

OHLSSON

THOR

No premiums on price-fixed items

2 MARVELOUS CATALOGS

We have two fine, large catalogs for you. One is **FREE**, the other costs you 10c (stamps or coin). Hundreds of illustrations, thousands of items. Special articles on selecting your plane and engine, flying, trouble shooting, etc. Gas—Rubber—Solids—Planes—Cars—Accessories.

SEND FOR YOURS TODAY!!

If it's Advertised we can supply it!

HOW TO ORDER

Send remittance in full (we prepay package and insure) or send $1 and we ship collect C.O.D. same day for balance. Address your order to us at your nearest branch.

AMERICA'S HOBBY CENTER, INC.

A GENERATION OF FAIR DEALING GUARANTEES YOUR SATISFACTION

Dept. MC-58 156 West 22 St., New York 11, New York

Dept. MC-58 55 E. Washington St., Chicago 2, Illinois

Dept. MC-58 Suite 230—742 Market St., San Francisco 2, California

ESTABLISHED 1931

America's Hobby Center is the country's LARGEST motor and gas model headquarters.

LARGEST HOBBY MAIL ORDER FIRM IN AMERICA 1948

Read Free Offer on opposite page

ENGINES

• Arden .099	(Cl. A)	$12.50
• Marvin	(Cl. A)	15.50
• Bullet	(Cl. B)	12.75
• Cannon 300	(Cl. B)	19.75
• DeLong 30	(Cl. B)	15.50
• Forster 29	(Cl. B)	14.85
• Forster .305	(Cl. C)	14.85
• Hurricane	(Cl. B)	19.75
• Meleraft	(Cl. B)	18.50
• Rogers 29	(Cl. B)	15.75
• Torpedo	(Cl. B)	18.50
• Super Cyclone Dual	(Cl. D)	19.95
• Super Cyclone	(Cl. D)	18.95
• Cannon 358	(Cl. C)	21.50
• Ohlsson 60	(Cl. D)	11.95
• OK Super 60	(Cl. D)	18.00
• Rocket	(Cl. C)	22.50
• Vivell 35	(Cl. C)	12.50
• Vivell Twin	(Cl. D)	30.00
• K & B Torpedo 29	(Cl. B)	18.50
• K & B 24	(Cl. B)	16.50
• Mohawk Chief	(Cl. B)	8.95
• Pacemaker	(Cl. D)	24.95
• OK Super 29	(Cl. B)	16.50
• OK Twin	(Cl. E)	49.00
• Super Champion	(Cl. D)	17.50
• Atom	(Cl. A)	15.50
• Arden .099BB	(Cl. A)	15.50
• Arden .199	(Cl. A)	18.50
• Vivell 49	(Cl. C)	20.00
• Contestor	(Cl. D)	18.50
• Ken	(Cl. D)	25.00
• McCoy 60 (Series 20)	(Cl. D)	27.50
• Hornet 60	(Cl. D)	22.75
• Wenson	(Cl. B)	20.00
• Harleman	(Cl. D)	20.00
• G. H. Q.	(Cl. D)	9.95
• Judco Kit	(Cl. B)	6.95
• McCoy 49	(Cl. C)	25.00
• McCoy 29	(Cl. B)	19.50
• Air-O Mighty Midget	(Cl. C)	25.50
• O.K. Bantam	(Cl. A)	16.50
• Phantom P-30	(Cl. B)	13.95
• Pierce "J"	(Cl. B)	9.95
• Hassad Sky Devil	(Cl. D)	37.50
• OK 60 Race	(Cl. D)	23.00
• Forster 99	(Cl. E)	24.75
• Genie 29	(Cl. B)	6.95
• Rogers Ram	(Cl. B)	9.95
• New Thor	(Cl. B)	9.95
• New Thor Kit	(Cl. B)	6.95
• Ohlsson 19	(Cl. A)	9.95
• Ohlsson 23	(Cl. B)	9.95

DIESELS

• Aero Diesel	(Cl. B)	$16.50
• Mavo Diesel	(Cl. A)	14.95
• Drone Diesel	(Cl. B)	14.85
• Mite Diesel	(Cl. A)	12.50
• C I E Diesel	(Cl. A)	11.95
• Doozil	(Cl. A)	12.95
• Doozil Ball Brg.	(Cl. A)	17.95
• K & B Glo-Torp	(Cl. B)	14.95
• O.K. Hot-Head	(Cl. B)	12.50

AIR ENGINES

• CO_2	$ 4.95

GLO PLUG ENGINES

• Mighty Midget GP	(Cl. C)	$14.75
• Sportsman Jr.	(Cl. C)	14.95
• Sportsman Sr.	(Cl. C)	16.95

JET ENGINES

• Dyna-Jet	$24.50
• Dyna-jet Redhead	35.00
• Minijet	35.00

AND ALL THE OTHERS

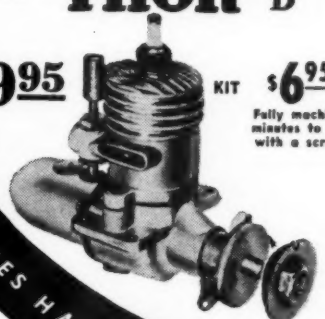
These Engines Set the Standard for Quality and Price !!

MORE THORS & GENIES HAVE BEEN SOLD IN 2 YEARS THAN ANY OTHER ENGINE!!

the New.. **THOR "B"**

$9.95 KIT $6.95

Fully machined, five minutes to assemble with a screwdriver



The Miracle Engine at a Miracle Price

Boys! Here is the engine you've always wanted. An engine that's been acclaimed the "easiest starting gas engine." It's the lightest weight class B engine — only 4 ounces complete, it's economical to run, long lasting and available at a reasonable price. Genie gives you everything! Compare the Genie 29 with any other Class B engine on the market at any price!

The Genie 29 has been developed by our staff — men with 15 and 20 years' experience — to give you a low-priced engine that incorporates the features of the highest priced engines available today plus additional features found in no other engine! No expense has been spared to make the Genie 29 an engine you can depend upon for *fun in flying*. High pressure Doehler-Jarvis die-castings, genuine silver contact points that eliminate pitting, Beryllium copper breaker point spring for smooth, constant operation, a transparent fuel tank and a gauge to estimate running time, chromium wearing surfaces, pressure lubrication of the piston and crankshaft, a Champion spark plug — all these features and many others make the Genie 29 the *best buy at any price!*

The Thor Gives You Everything You Want in Your Engine A REAL POWER PLANT!

- Ideal for free-flight and U-Control planes, boats and midget cars.
- Complete fully illustrated instruction manual.
- Full 30 day guarantee against defective parts.
- Every part precision engineered to perfection.
- Lowest weight of all "B" engines without sacrifice of power.
- Streamlined for cooler operation and longer life.
- Automatic "dual" carburetor for quick "break-in."
- Easy to start, "a twist of the wrist." High compression ratio for instant starting. New PRESTO disc starter eliminates prop "flipping."
- Steady and consistent running.
- New intake design for non-flooding and positive adjustment.
- "STEEL-IZED" piston, cylinder and bearing surfaces micro-precision fitted to .0001". Seize and wear proof. Special oil grooves for longer life.
- Extra long crankshaft of polished-ground steel, scientifically balanced. ½" bearing surface with forced double lubrication for longer wear.
- Perma-designed foolproof Beryllium "FLOATING" timer—never needs adjustment—can't slip in operation. Positive automatic spring action.
- Castings made of new "THOR" alloy. With more heat dissipation and wearing quality than any other engine.
- Uniflow piston.
- Integral all-metal tank.
- Invertible and runs in either direction.
- Replacement parts available and interchangeable.

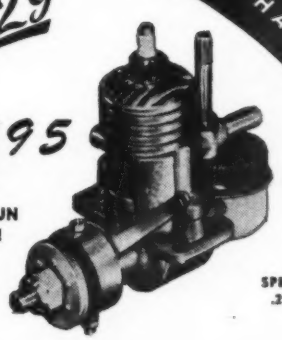
POWER, DEPENDABILITY, LOW COST "EASY TO START"—"EASY TO RUN"

SPECIFICATIONS: .29 cu. in. displ. weight 4¼ ozs. Class B, AMA Rules

Genie 29

$6.95

READY TO RUN NOT A KIT!



SPECIFICATIONS: .29 cu. in. displ. weight 4 ozs. Class B, AMA Rules

Precision engineered - Precision built

Buy with confidence at A.H.C. where Your interests come first !!

2 MARVELOUS CATALOGS

We have two fine, large catalogs for you. One is FREE, the other costs you 10c (stamps or coin). Hundreds of illustrations, thousands of items. Special articles on selecting your plane and engine, flying, trouble shooting, etc. Gas—Rubber—Solids—Planes—Cars—Accessories

SEND FOR YOURS TODAY!

ENGINE CLASSES

NYC Modelers may attend our free Sat. Morn. Classes (9:30 A.M.)

FREE — Strobotac rpm readings of your favorite Engine.

HOW TO ORDER

Send remittance in full (we prepay package and insure) or send $1 and we ship collect C.O.D. same day for balance. Address your order to us at your nearest branch.

Dept. MC-58 156 West 22nd St. New York 11, New York

Dept. MC-58 55 E. Washington St. Chicago 2, Illinois

Dept. MC-58 Suite 230—742 Market St., San Francisco 2, California

AMERICA'S HOBBY CENTER, INC.

A GENERATION OF FAIR DEALING GUARANTEES YOUR SATISFACTION

ULTRA-MODERN BEE-LINE JETS

THE TINY NEW SUPER FAST CO_2 PROPELLED RACING MODELS

Slick As A Whistle

SUPER SONIC STREAK

Fast As Lightning

Thrilling Speed-Long Range Flights

The Tiny New BEE-LINE JETS Whiz Through The Air On A Fine Steel Guide Line At Astounding Speeds Up To 125 M.P.H. For Distances Up To 1000 Ft.

FLASH ROCKET

NEW JIFFY-BUILT KITS

★ Bodies Completely Formed, Sanded And Bored For CO_2 Cartridge.
★ All Other Parts Cut To Shape.
★ Finished Metal Parts.
★ Complete Plans And Instructions.

Kits Only 75c Each

SPEED-IT GUIDE LINE WIRE

200' COIL..... 60c
400' COIL.....$1.00
600' COIL.....$1.40

Thrilling As A Trip To The Moon

ANOTHER STANZEL FIRST

VICTOR STANZEL & COMPANY

A post on Control Line Flying

SCHULENBURG, TEXAS

SCRAP BOX

BY BILL WINTER

ONE mid-February night we betook ourselves to an armory in Teaneck, N.J., to see a little indoor flying. Present was a small but colorful assortment of experts and an even more interesting collection of models. Frank Ehling had a rather large *Campus*-powered stick with an interchangeable nose plug for rubber, and a *Campus*-powered U-control job with square stunt-type wings. Leon Schulman, Bob Tucker and company were flying their *Drone* stunt ships. Pete Andrews, the indoor hot shot, looked in. Red Kochman, from Polk's, had his first indoor ship in 9 years and was also testing an *OK-CO2* equipped Curtiss Junior scale model.

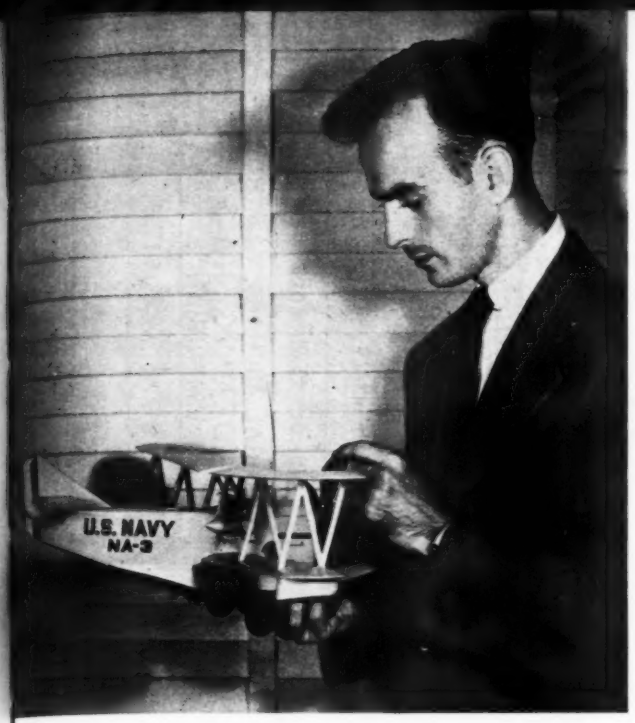
Bill Tyler took the wraps off his latest indoor dream ship with peculiar manta-shaped wings. He also contributed a conventional tissue-covered R.O.G.—but with a pusher prop—to the melee. We had some fun with this one ourselves, trying out a real-plane adjustment we'd learned from ruddering a stubborn *Champion* around the sky. Washin in the right or outside wing, and left rudder, got this midget circling nicely. Later Tyler leaned on the winder to the tune of 1,600 turns—so help us!—and the ship was lost among the rafters at 1:49. There were more freak and near-freak models, and more fun that night than we have seen in a dog's age.

We couldn't help but think of a letter from Seattle telling how the boys can't find a suitable location for free flight within 50 miles. What has model building come to? Such a premium has been placed on certain types of outdoor models that we apparently are breeding a kind of model airplane dinosaur, doomed to near extinction. Big gas jobs that can't be flown in many localities—and that crackup when you do fly them. Where's this vaunted science of ours? The fun is at the small end of the scale, not the large end. Someday we hope to see Class A, maybe B, as the biggies with complimentary sizes running down the scale. The day will come when you will see free flight gas, and CO2 flown indoors as well as outdoors. (Will the *Campus* force a new indoor event?) When models get easy to fly, and hard to break—as they do in small sizes—we are liable to find ourselves with a million new modelers on our hands! We, the builders, don't make the progress these days; rather it is the manufacturer who brings out radically new things—like CO2 and U-control—who has to make it in self defense. It must be 10 years since the first *Zipper!*

Supplementing last month's dope on new records, here are a few more worth noting. Maurice Stanglin, a Dallas boy, got 107.48 mph out of a *Bantam* .19-powered Class A (Senior) control liner. Its 12 in. wing tapered 3 in. at the root to a mere 1-1/4 in. at the tip. Length was 15 in. and weight 8-1/2 oz. A new mark of 24:2.6 (best 3 out of 9) for Class C Open outdoor hand-launched glider was set on Feb. 8 by James Tangney, whose mail reaches him aboard the U.S.S. Duluth. Projected span is 23-1/2 in., root chord 4-3/4 in., and projected area 103.2 sq. in. Flat-bottomed wing, 13/32 in. thick. Pine fuselage, 24 x 3/4 x 3/16". Tail of 3/32 in. sheet; weight 1.7 oz. Dope finish with 4 coats on wing and 2 on tail.

Actual time on first flight was 20:09, but

(*Turn to page* 41)



Loening Amphibian

by WALTER A. MUSCIANO

EVERYONE is familiar with Admiral Richard E. Byrd's North Pole expedition on which he used the Fokker trimotor *Josephine Ford;* however few are aware that without the data accumulated on his previous North Greenland expedition in 1925 this flight would have been impossible. The hazardous flights over the "Greenland Ice Cap" (the world's iceberg factory) required rugged utility aircraft capable of land and sea operation and strong enough to withstand the terrific winds often encountered at this point. The U. S. Navy had no airplane that could meet these requirements, but the Army had. Consequently three *Loening* amphibians were acquired for use on this expedition and were designated NA-1, NA-2 and NA-3.

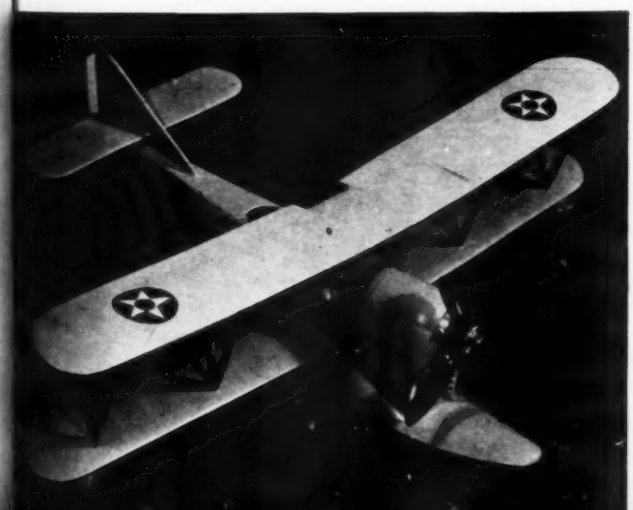
Although the planes indicate a *Mite* diesel engine, the model can be flown with electric spark ignition engines from .099 to .199 cu. in. displacement using *Liquid Dynamite* to "dieselize" them. A dieselized *Arden* was successfully used for quite some time. The elimination of coil, condenser and batteries allows more weight to be put into the ship's structure for added strength, but the weight factor should still be kept in mind as the model is being built. Try to keep the weight under 10 oz.

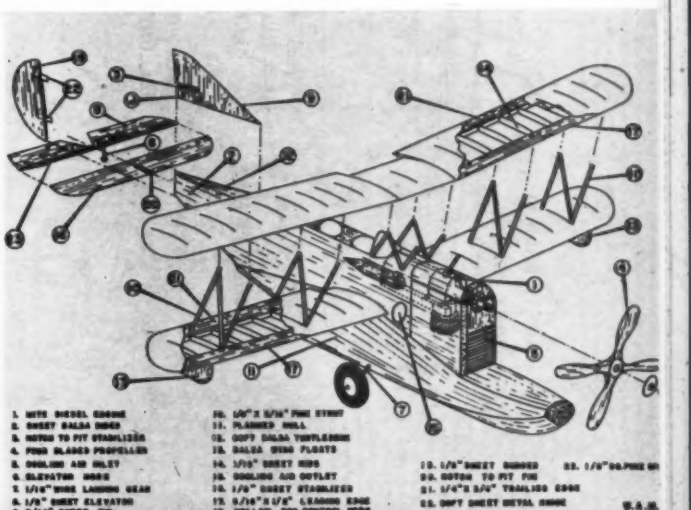
Full size bulkheads, formers and ribs are shown on the plans and the rest of the drawing is one-half model size. The fuselage is constructed entirely of sheet balsa to insure its simplicity, strength and waterproof qualities. First the two fuselage sides are cut from 1/16" sheet hard balsa and sanded smooth on both sides to about 1/20" thickness. The hardwood engine mounts are cemented to these sides and allowed to dry, during which time the fuselage bulkheads and formers are cut to shape. These are cemented in their proper location using plenty of cement. Cut the stabilizer and elevator from 1/8" soft balsa and the fin from 3/16" soft balsa. After the control rod has been attached to the elevator, the horizonal tail assembly can be mounted on the fin and securely cemented. The turtledeck is now attached to the fuselage and the rudder added. Attach the bellcrank assembly as shown in sketch. It is advisable to construct and attach the lower wing at this time. The consruction is very simple; remember to leave the leading and trailing edge stubs as shown on the plan. Cut away the fuselage sides to admit the wing stubs and, when the proper dihedral is set, plenty of cement can be applied through the open fuselage bottom gluing the forward stubs to the plywood bulkhead.

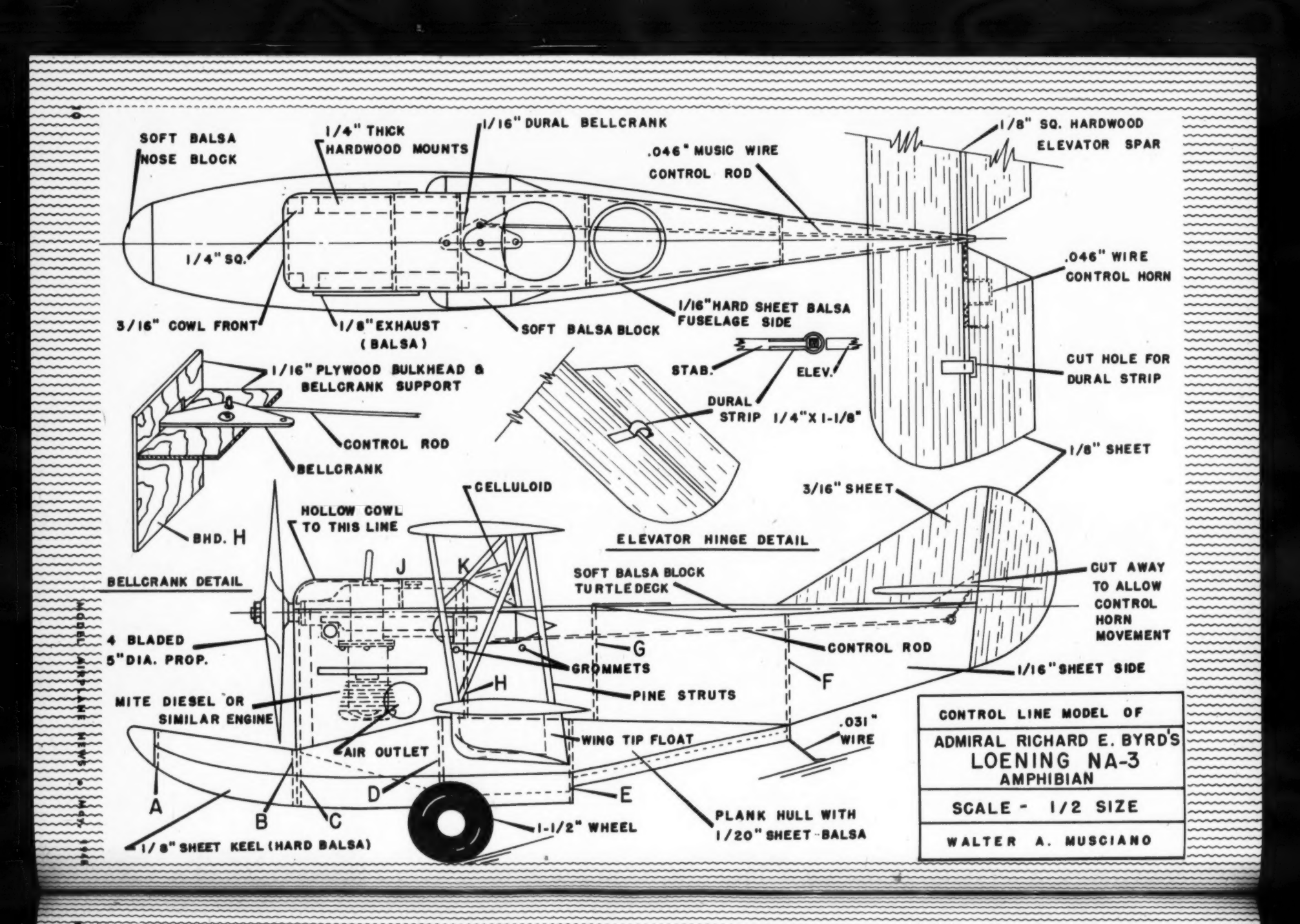
The author's model had a retractable landing gear in spite of the fact that takeoffs as well as landings can be made without the gear, when flying over grass. Many amphibian models feature landing gears that are flimsy in the "down" position and tear off or collapse on the first rough landing. If a portion of the radiator grill is made as a hatch, by using a magnetic screw driver the retaining bolt (steel) can be removed and the coil spring will hold the gear in the "up" position. This assembly should be mounted on the plywood float bulkhead and the bulkhead attached to the fuselage to be followed by the float keel and remaining balsa bulkheads. The entire float is planked with 1/20" sheet balsa after the tail skid has been cemented in place. Covering the cowl from former K to J with 1/20" sheet and carving the float nose and the cowl from a soft balsa block completes the fuselage. The cowl block is hollowed and held in place with dress snaps.

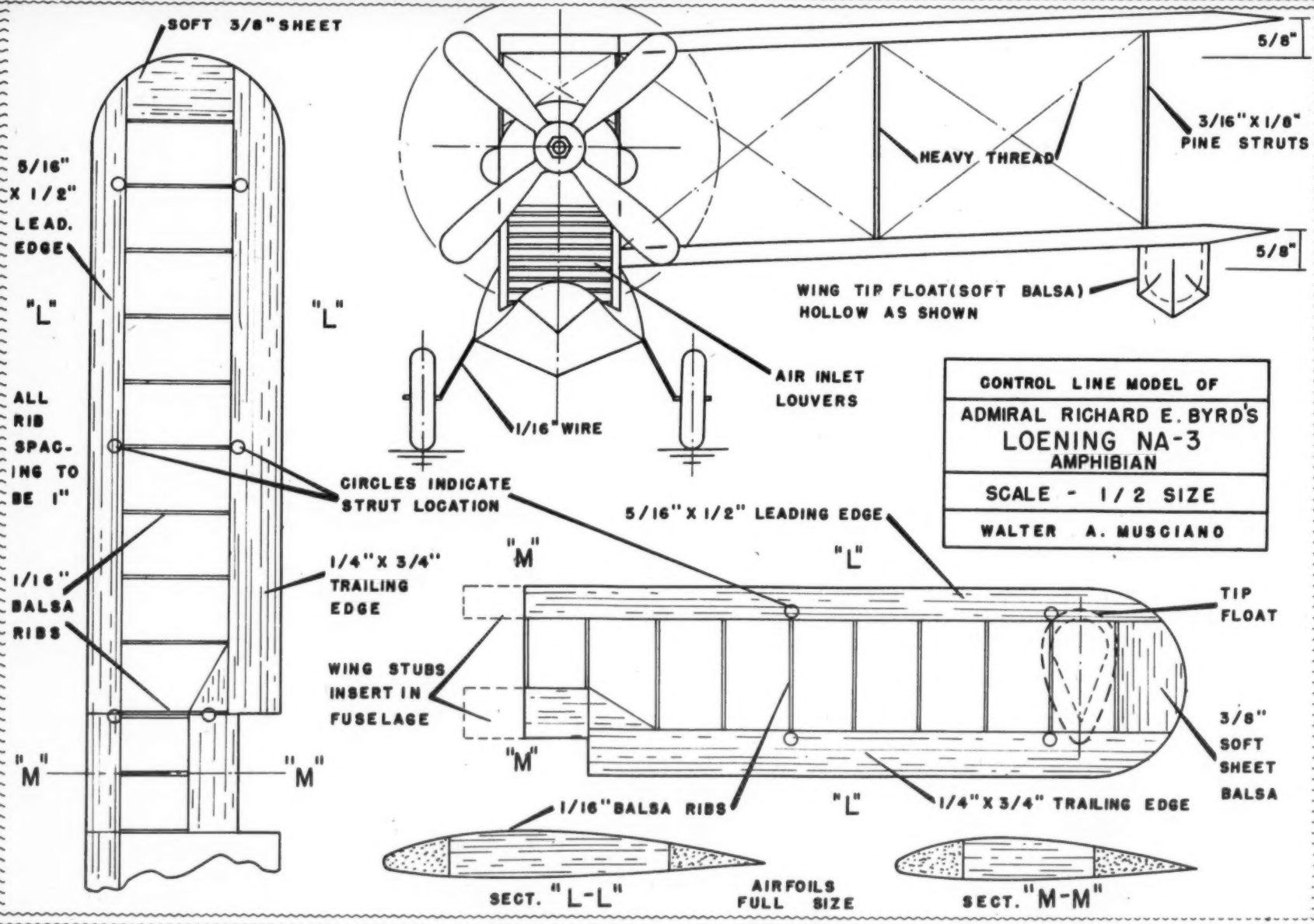
The wing struts are cut from 3/16" x 1/8" pine strips sandpapered to a streamline section. When cementing the struts to the wing be sure they are cemented to the framework and not just the Silkspan. The upper wing is now constructed and covered with Silkspan. The wings received three coats of clear

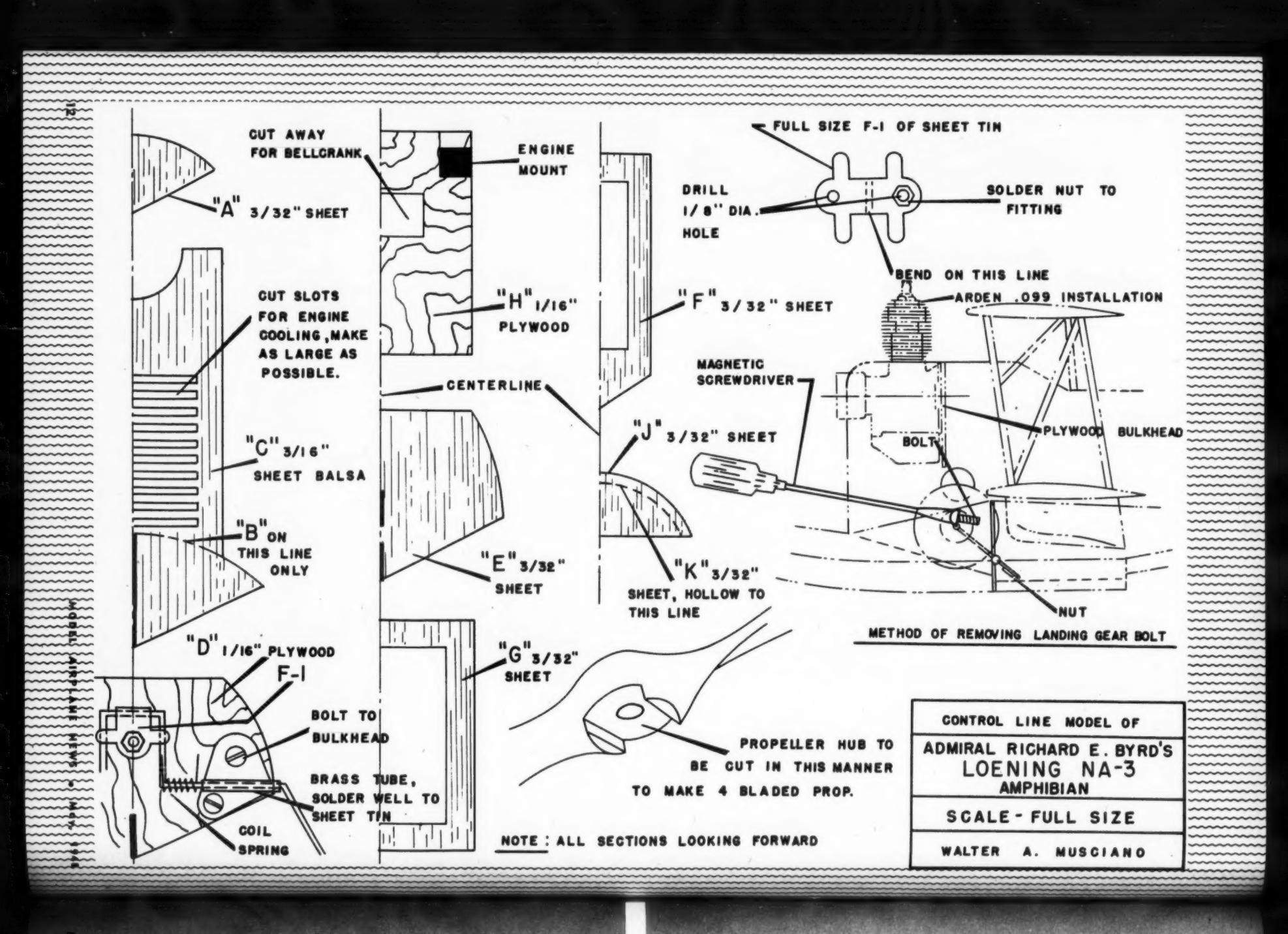
(*Turn to page* 41)






SOFT BALSA NOSE BLOCK
1/4" THICK HARDWOOD MOUNTS
1/16" DURAL BELLCRANK
.046" MUSIC WIRE CONTROL ROD
1/8" SQ. HARDWOOD ELEVATOR SPAR
1/4" SQ.
3/16" COWL FRONT
1/8" EXHAUST (BALSA)
SOFT BALSA BLOCK
1/16" HARD SHEET BALSA FUSELAGE SIDE
.046" WIRE CONTROL HORN
CUT HOLE FOR DURAL STRIP
1/16" PLYWOOD BULKHEAD & BELLCRANK SUPPORT
CONTROL ROD
BELLCRANK
BHD. H
STAB.
ELEV.
DURAL STRIP 1/4" X 1-1/8"
ELEVATOR HINGE DETAIL
1/8" SHEET
3/16" SHEET
CELLULOID
HOLLOW COWL TO THIS LINE
BELLCRANK DETAIL
J
K
SOFT BALSA BLOCK TURTLE DECK
CUT AWAY TO ALLOW CONTROL HORN MOVEMENT
4 BLADED 5" DIA. PROP.
G
GROMMETS
CONTROL ROD
F
1/16" SHEET SIDE
MITE DIESEL OR SIMILAR ENGINE
H
PINE STRUTS
AIR OUTLET
WING TIP FLOAT
.031" WIRE
A
D
E
B
C
1-1/2" WHEEL
PLANK HULL WITH 1/20" SHEET BALSA
1/8" SHEET KEEL (HARD BALSA)
CONTROL LINE MODEL OF
ADMIRAL RICHARD E. BYRD'S
LOENING NA-3
AMPHIBIAN
SCALE - 1/2 SIZE
WALTER A. MUSCIANO


SOFT 3/8" SHEET
5/16" X 1/2" LEAD. EDGE
"L"
"L"
ALL RIB SPACING TO BE 1"
1/16" BALSA RIBS
CIRCLES INDICATE STRUT LOCATION
1/4" X 3/4" TRAILING EDGE
"M"
"M"
"M"
"M"
5/8"
3/16" X 1/8" PINE STRUTS
HEAVY THREAD
5/8"
WING TIP FLOAT (SOFT BALSA) HOLLOW AS SHOWN
AIR INLET LOUVERS
1/16" WIRE
CONTROL LINE MODEL OF
ADMIRAL RICHARD E. BYRD'S
LOENING NA-3
AMPHIBIAN
SCALE - 1/2 SIZE
WALTER A. MUSCIANO
5/16" X 1/2" LEADING EDGE
"L"
TIP FLOAT
WING STUBS INSERT IN FUSELAGE
3/8" SOFT SHEET BALSA
"L"
1/16" BALSA RIBS
1/4" X 3/4" TRAILING EDGE
SECT. "L-L"
AIRFOILS FULL SIZE
SECT. "M-M"


CUT AWAY FOR BELLCRANK
ENGINE MOUNT
"A" 3/32" SHEET
CUT SLOTS FOR ENGINE COOLING, MAKE AS LARGE AS POSSIBLE.
"H" 1/16" PLYWOOD
"F" 3/32" SHEET
CENTERLINE
"C" 3/16" SHEET BALSA
"B" ON THIS LINE ONLY
"E" 3/32" SHEET
"D" 1/16" PLYWOOD F-1
"G" 3/32" SHEET
BOLT TO BULKHEAD
BRASS TUBE, SOLDER WELL TO SHEET TIN
COIL SPRING
NOTE : ALL SECTIONS LOOKING FORWARD
FULL SIZE F-1 OF SHEET TIN
DRILL 1/8" DIA. HOLE
SOLDER NUT TO FITTING
BEND ON THIS LINE
ARDEN .099 INSTALLATION
MAGNETIC SCREWDRIVER
"J" 3/32" SHEET
PLYWOOD BULKHEAD
BOLT
"K" 3/32" SHEET, HOLLOW TO THIS LINE
NUT
METHOD OF REMOVING LANDING GEAR BOLT
PROPELLER HUB TO BE CUT IN THIS MANNER TO MAKE 4 BLADED PROP.
CONTROL LINE MODEL OF
ADMIRAL RICHARD E. BYRD'S
LOENING NA-3
AMPHIBIAN
SCALE - FULL SIZE
WALTER A. MUSCIANO

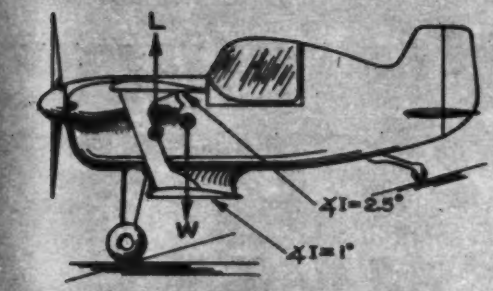
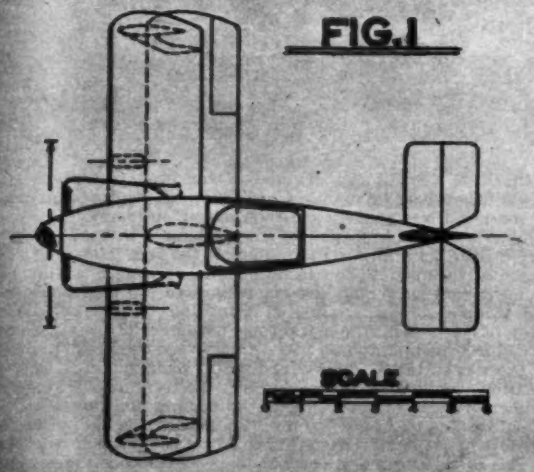


FIG. 1



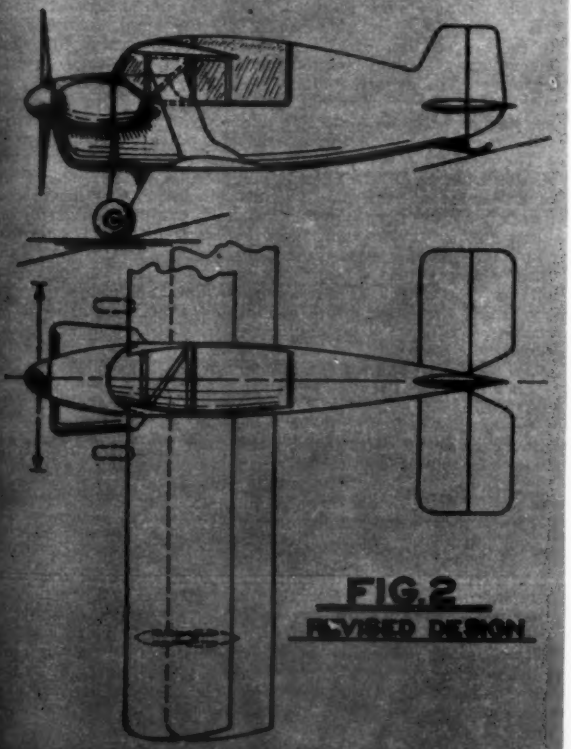


FIG. 2
REVISED DESIGN

It is easy to calculate the expected performance of your dream ship if you use a few simple formulas. They are given here with instructions for use and will afford reasonably accurate results

design forum

by CHARLES H. GRANT

EVERY month "Design Forum" receives many more ideas than it can handle, in the manner they deserve. Most of them are from young men. It is interesting to note that those from older readers deal more with the ways of doing things rather than with the ideas themselves. Can it be true that the older we get the fewer ideas we have?

This theory is justified by the experience of many. One might say that young men have the ideas but lack the knowledge of how to apply them properly which years of experience bring. Often our schools teach mathematics, physics and other phases of engineering which are necessary to carry out engineering ideas accurately. Only too often, however, students are left high and dry by their instructors because they are not taught how to apply these theoretical subjects. Usually it is necessary to have a number of years of practical experience before these "tools of science" can be used properly to achieve practical results; and after all, results are the only things that count, as you will learn sooner or later.

All this may seem irrelevant to our discussions here, but it was inspired by a letter from J. Alfred Dixon of Alberta, Canada, who sent us plans for a minature single place sport biplane, Fig. 1. The plans and letter contain many fine ideas but no calculations to substantiate the engineering values and performance he claims; they are theoretical but not practical. Evidently the design was inspired by his desire to have a small convenient and comparatively cheap plane in which he could fly. To hold down the size to a minimum and obtain maximum amount of area he laid out his ship as a biplane. This enables him to obtain considerable area with a relatively short and compact fuselage. To get maximum visibility, he placed the biplane wing combination low so that the upper wing fairs into the streamlining of the engine cylinders below the pilot's line of sight.

However the wings are placed a little too far forward. In this position the center of lift (c.l.) marked on the drawing is forward of the center of gravity (c.g) This will cause the plane to be tail heavy. The wing should be moved back so that the c.l. is slightly back of the c.g. Another course may be followed if preferred: the wings may be kept in the original position and the nose lengthened so that the engine is farther forward. This will bring the c.g. forward.

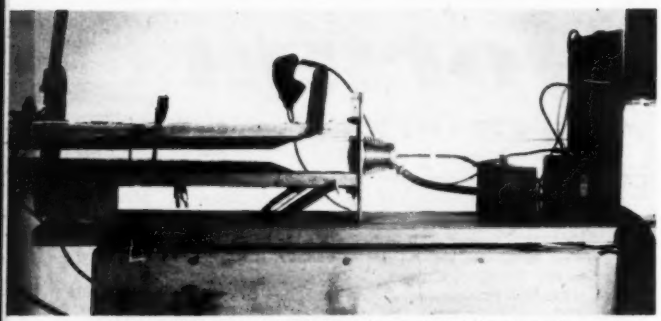
But Mr. Dixon's design is actually a picture and not the design of an airplane that gives the performance which he specifies in his letter. In other words, he has laid out a drawing incorporating a number of unique features without calculating the required engineering characteristics for the desired performance. It appears that the specifications given are arbitrary and based on wishful thinking instead of mathematical calculation.

He describes the features of the plane as follows: span 12 ft.; chord 2½ ft.; wing area 50 sq. ft. approx.; overall length 12 ft.; maximum fuselage width 2 ft.; cockpit maximum height 42 in.; length 30 in.; propeller diam. 60 in.; engine 50 hp. 4 cylinder,

(*Turn to page* 52)

Miniature PULSE JETS

Successful jet controlliner built by the author and held by Wally Wright



Glass walled research jet built and operated at New York University

The author has not only built and flown jet propelled models but has done extensive research on them as well— he gives here hints gleaned from this wide experience

by JERRY LEMELSON

Jet powered model Bell XS-1 air intake is through the uncovered cockpit

ABOUT 2 YEARS ago the model world was introduced to its first model jet engine. Initial enthusiasm ran high, and the more curious and adventurous model builders with a yen to experiment with something revolutionary in model flying wasted little time in purchasing one of the jets. However, Joe Doaks, accustomed to the techniques of starting and running the customary prop spinning engines, often ran into considerable trouble somewhere in his transition to jet propulsion.

The first jets to hit the market had a number of "bugs" which needed ironing out, and as a result many soon referred to them as "those darn jets." They were hard to start, and once started the trick was to keep them running. Today, however, after a number of design improvements the engines can be started in a few seconds and kept running for a barrel of flying thrills.

Latest in jet engine design is the *Dyna-Jet* which develops 4¼ lbs. of thrust, and is equivalent to a reciprocating gas engine delivering greater than 2 hp at 135 mph (assuming 75% propeller efficiency).

Before continuing with a description of the model jets, let us delve a bit into the history of this particular type of jet engine.

Shortly after the invasion of Europe in June 1944, the Germans sent their first flying bombs over England. In flight the bombs, which resembled a torpedo with wings, gave off a loud buzzing noise that could be heard for miles by the English populace. The missle was of conventional design with cigar shaped fuselage, clipped wings, elevator and rudder. An object strongly resembling a stovepipe was mounted above the fuselage and extended along 2/3 the length of the body to the tail section. This was the bomb's powerplant and was incorrectly classified by many aviation experts at the time as a ram-jet. Today scientists refer to it as an aeroresonator or resonating jet engine. It has also been tagged with such names as: resojet, buzz-jet, pulse jet, and intermittent jet; the engine will be referred to in this article as a pulse or resonating jet.

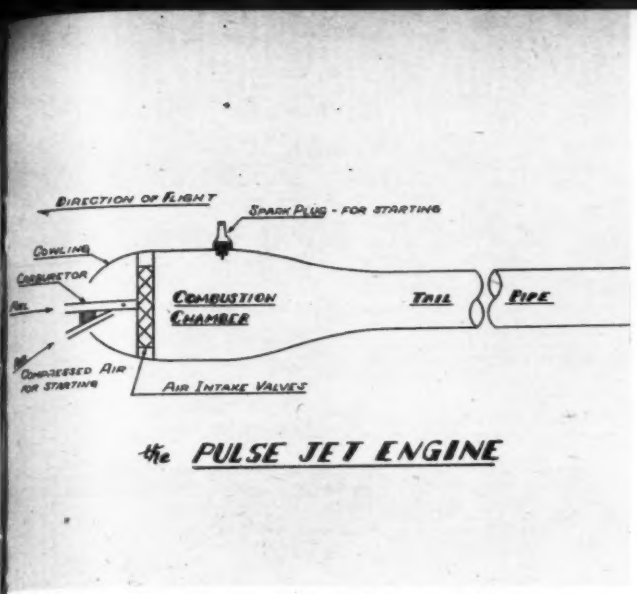
The resonating jet engine is not a brainchild of World War II. As far back as 1909 a French inventor, Marconnet, conceived of an engine operating on similar principles. His accomplishments were limited, however, to analytical thinking and his ideas got no further than the drawing board. It appears that Marconnet's notes were buried in some files and forgotten, for little if any experimental work was conducted on an engine of this type until 1928. At that time Paul Schmitt, a German consulting engineer, while conducting experimental work on rockets, conceived a jet engine design which resembled Marconnet's engine. He continued with the experiments until 1935 when he obtained the support of the Luftwaffe.

So much for history.

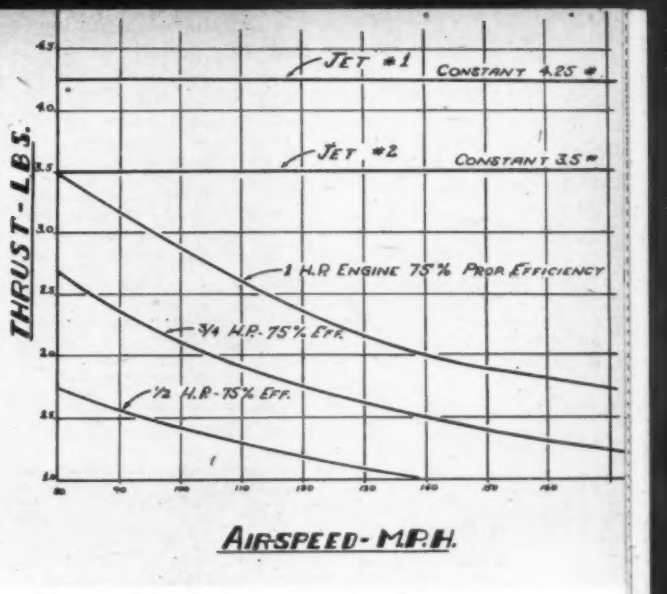
Thinking of flying your next control line model with jet propulsion? If so, a study of jet theory and operational characteristics will help to explain and clear up some of the problems you may encounter in designing and flying that model.

We must emphasize here that you should always bear in mind that these model jets are not toys. They must be handled with adult care and judgment.

Let's look at a typical model pulse jet engine. The cowling at the front end of the engine has a function similar to the cowl of a radial aircraft engine; it acts both as a duct thru which intake air is drawn and as a streamlined housing for the fuel jet and valves. In operation, air is drawn thru the cowl and enters the combustion chamber thru the intake valves. These valves have been of various designs on various pulse jets; three of the most common in use are: (1) reed (2) pyramid and (3) petal type; the latter is the simplest and most efficient and is employed in present model jets.



The pulse jet is a very simple powerplant as this drawing proves



Comparison of *dynamic thrust* for various jet and prop engines

The engine is simplicity itself, for these valves are the only moving parts. They vibrate, when running, with the operating or resonant frequency of the engine (between 200-300 times per second).

Housed in the cowl and sometimes extending from the front end of the engine is a carburetor which in its simplest form consists of nothing more than a piece of metal tubing with a hole drilled in it. Fuel drawn from a gasoline supply is vaporized as it sprays out of the orifice and enters the combustion chamber thru the valves, where it is ignited by a sparkplug. The compressed air pipe at the nose of the engine has a twofold use in starting. It creates a suction by which fuel is drawn from the tank and vaporized, and it opens the intake valves for the initial charge. Once the engine is started combustion is self sustaining and no artificial blast of air is necessary, since atmospheric air is drawn in at sufficient velocity to vaporize the fuel.

Operation consists of a continuous series of rapid burnings or explosions which occur at a fixed frequency depending on the design of the engine.

The cycle of operation starts when the valves are opened initially by a blast of compressed air mixed with vaporized gasoline. When the charge reaches the sparkplug, which is continually energized, combustion starts and the resulting exposion closes the inlet valves. The energy released as heat is transmitted to the column of air existing in the tail pipe. As this air column is forced rearward with the gases of combustion at high velocities, it reacts to create forward thrust. This is the basic principle of jet propulsion which is a simple application of Newton's Second Law of Motion (to every action there is an equal and opposite reaction).

As the gases rush out of the tailpipe, a negative pressure is created in the combustion chamber which opens the valves once more and draws in a fresh charge of air and gasoline vapor. Once the engine is started, the ignition may be turned off as no spark is necessary.

The above cycle occurs intermittently many times per second hence the name intermittent or pulse jet. The term *resonating* is used to explain the pressure phenomena in the tailpipe which resembles in many respects the vibrating air column of an organ pipe.

Thrust is the result of these intermittent explosions, whereas in a turbo-jet or rocket, thrust is caused by a steady uninterrupted flow of escape gases. Since most of the air column in the tailpipe is shot out at high velocity with the hot exhaust gases, a new charge of air must be drawn in thru the exhaust end to be ready for the next cycle. This little-known fact has actually been proven by research scientists.

To get an overall picture of the combustion process during engine operation, several jets have been constructed with walls of clear pyrex, and by the use of high speed photography (2000 frames per second) a record is made of flame motion from the time of ignition to the time of exhaust over a period of several hundred cycles. These glass walled jets are relatively short-lived since the walls crack after 20 or 30 seconds of operation under the high temperatures, pressures and vibrations. However, they serve their purpose if the camera is started after the first few seconds of running.

Perhaps the research work of most interest to modelers is the determination of pulse jet thrust and how it compares with standard prop-spinning engines on the market today. Thrust is measured by running the engine in a mount against a calibrated spring which indicates pounds of static thrust. The curves presented herewith show thrust plotted against airspeed in mph. Jet thrusts remain fairly constant within the range shown. Latest wind tunnel tests on the standard *Dyna-Jet* engine reveal that thrust equals drag at 200 mph, which indicates that the level flight equilibrium condition for the jet unit exists at that speed. In other words, the jet is delivering sufficient thrust to propel itself at 200 mph.

For practical purposes, the ranges plotted concern speeds of between 75-150 mph. since present day U-control speed records fall within that range. Two jet curves representing standard market jet engines are presented as horizontal straight lines (constant thrust) with values of 3.5 and 4.25 lb. thrust.

As a comparison, several curves are plotted showing thrust variation with speed for 1, 3/4 and 1/2 hp propeller driven engines. These curves are not the results of actual performance tests on any particular engine rated at one of the above hp but are obtained from the energy equation:

$$T = \frac{P \times E}{V}$$

where:

T = lbs. of thrust
P = horsepower
E = propeller efficiency
V = airspeed

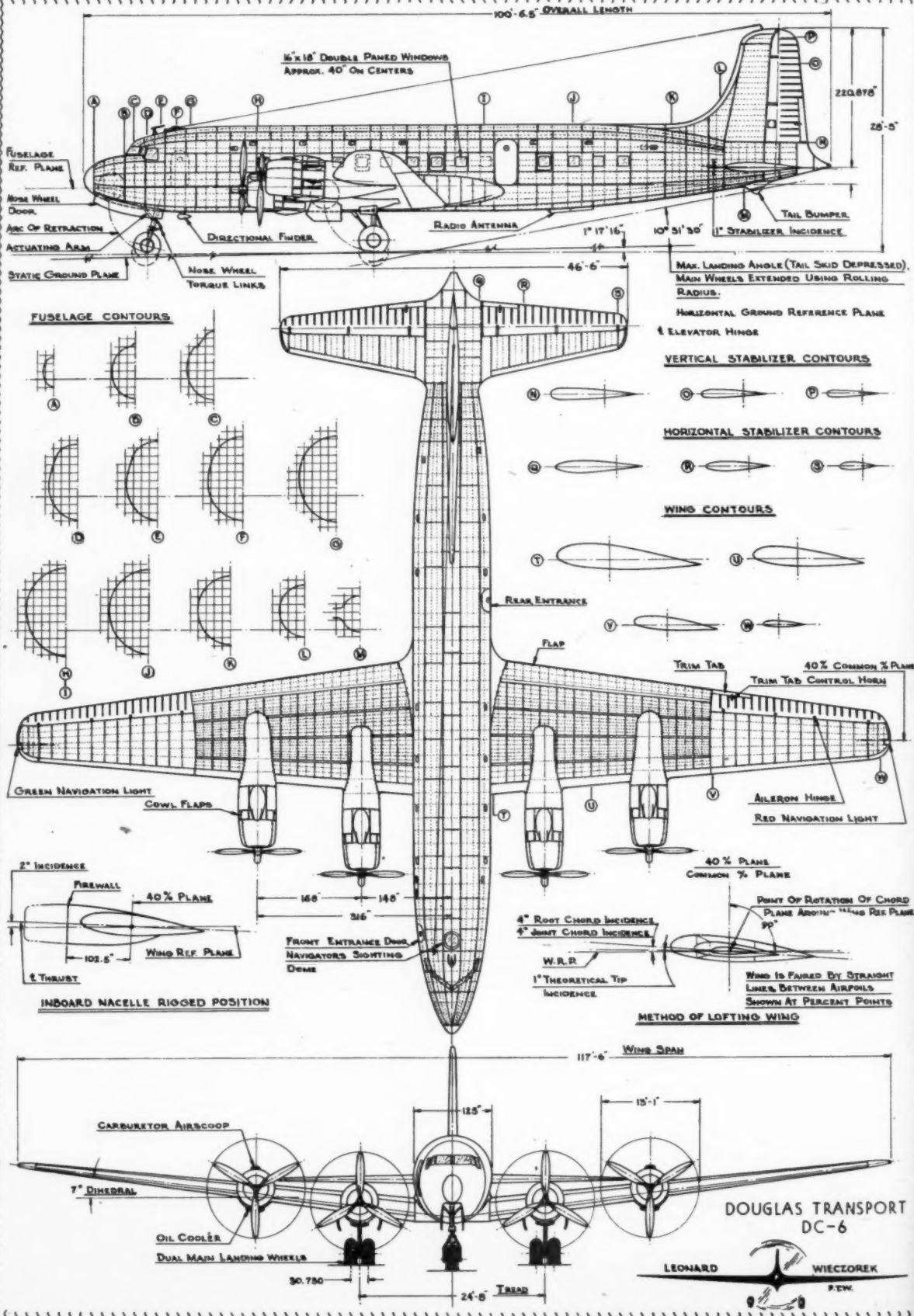
If pounds of thrust are desired and velocity (V) is used as miles per hour, multiply the numerical results of the above by 375 as the conversion factor. You will then obtain the results plotted on the graphs.

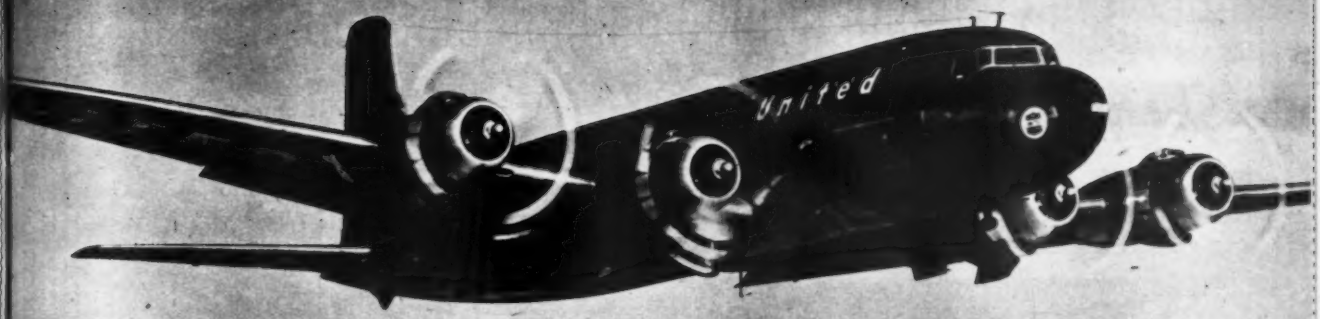
The curves assume that each engine can convert its rated hp (1, 3/4 and 1/2 hp with correction for propeller efficiency) at any airspeed. Actually, this is not the case since the curve of power available vs. speed (not shown) increases to its maximum and then falls off due to the limitations imposed by the prop. *This is nothing more than saying that a particular propeller design will give maximum performance at a given airspeed.* However, it is evident that the curves represent a series of points at which maximum rated hp is converted into thrust at any velocity in the range under discussion.

A glance at the curves reveals that while the jets continue to deliver rated thrust at all speeds within the given range, the thrust of the propeller driven engines drops noticeably with increased airspeed. For example, at 100 mph thrust at a rated 1 hp engine output (75% prop efficiency) is 2.55 lb.; at 140 mph thrust has dropped to 2.01 lb. For a rated 3/4 hp engine output, thrust drops from 2.11 lb. at 100 mph to 1.51 lb. at 140 mph, etc. Thus the ability of a prop spinning model to fly at higher speeds decreases with increased airspeeds since thrust decreases.

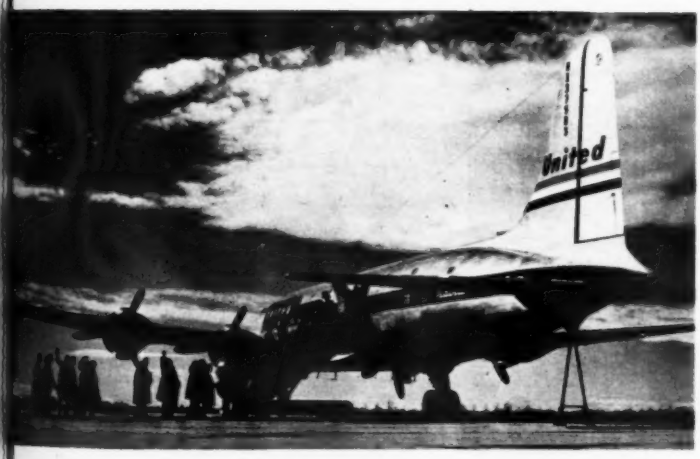
From the above it can be expected that the pulse jet engine, having a greater thrust to weight ratio than any engine within the present day U-control racing range, should be able to outpace the present day prop driven models. The limiting factor at present is parasitic drag (which includes profile drag), since most jet models have been designed and flown with the engine mounted above the fuselage thus increasing frontal area. However, even with this handicap, Harold Bunting has recorded speeds in excess of 132 mph with the standard

(*Turn to page* 45)


100'-6.5" OVERALL LENGTH
16"x18" DOUBLE PANED WINDOWS
APPROX. 40" ON CENTERS
22'0.875"
28'-5"
FUSELAGE REF. PLANE
NOSE WHEEL DOOR
ARC OF RETRACTION
ACTUATING ARM
STATIC GROUND PLANE
NOSE WHEEL TORQUE LINKS
DIRECTIONAL FINDER
RADIO ANTENNA
1° 17' 16"
10° 51' 30"
1° STABILIZER INCIDENCE
TAIL BUMPER
46'-6"
MAX. LANDING ANGLE (TAIL SKID DEPRESSED), MAIN WHEELS EXTENDED USING ROLLING RADIUS.
HORIZONTAL GROUND REFERENCE PLANE
℄ ELEVATOR HINGE
FUSELAGE CONTOURS
VERTICAL STABILIZER CONTOURS
HORIZONTAL STABILIZER CONTOURS
WING CONTOURS
REAR ENTRANCE
FLAP
TRIM TAB
TRIM TAB CONTROL HORN
40% COMMON ℄ PLANE
AILERON HINGE
RED NAVIGATION LIGHT
GREEN NAVIGATION LIGHT
COWL FLAPS
40% PLANE COMMON ℄ PLANE
2° INCIDENCE
FIREWALL
40% PLANE
102.5"
WING REF. PLANE
℄ THRUST
INBOARD NACELLE RIGGED POSITION
168"
146"
316"
FRONT ENTRANCE DOOR
NAVIGATORS SIGHTING DOME
4° ROOT CHORD INCIDENCE
4° JOINT CHORD INCIDENCE
W.R.R.
1° THEORETICAL TIP INCIDENCE
POINT OF ROTATION OF CHORD PLANE ABOUT WING REF. PLANE
90°
WING IS FAIRED BY STRAIGHT LINES BETWEEN AIRFOILS SHOWN AT PERCENT POINTS
METHOD OF LOFTING WING
117'-6" WING SPAN
12.5"
15'-1"
CARBURETOR AIRSCOOP
7° DIHEDRAL
OIL COOLER
DUAL MAIN LANDING WHEELS
30.750
24'-8" TREAD
DOUGLAS TRANSPORT
DC-6
LEONARD WIECZOREK
P.E.W.



DOUGLAS DC-6



PLANE ON THE COVER

by ROBERT McLARREN

THE DOUGLAS DC-6, now back in airline service after a 4-month absence, is the world's safest airliner. Never before in aviation history has an airplane been subjected to the microscopic safety examination experienced by the DC-6, by not one but many experienced aviation groups trained to be critical of airline safety.

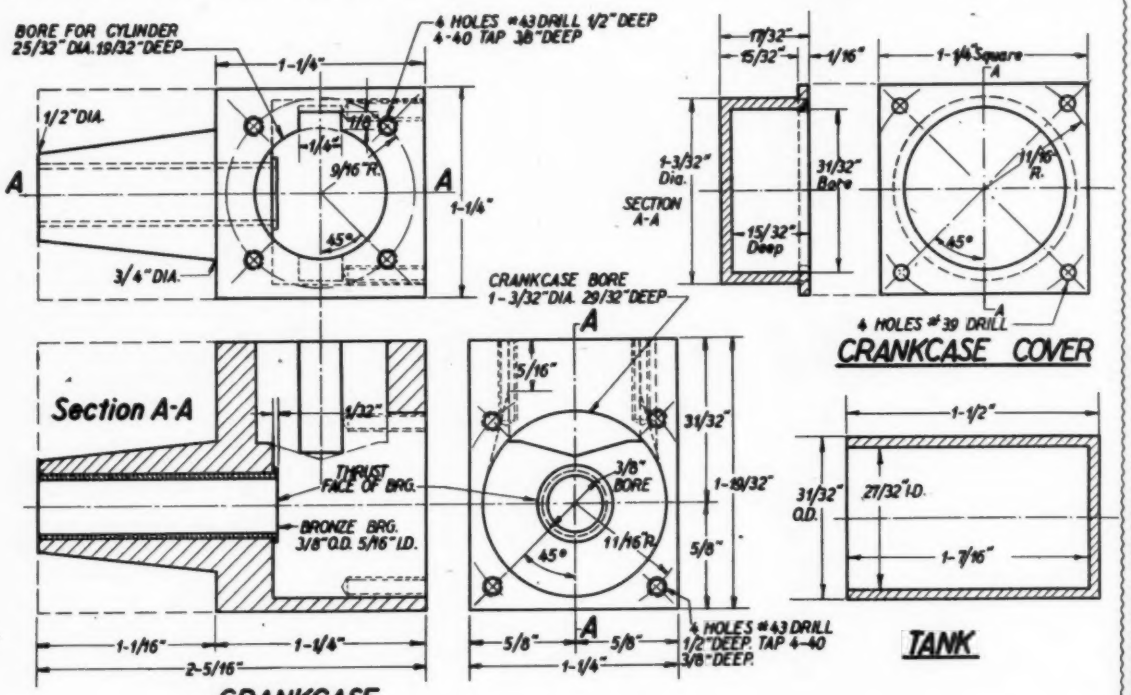
This investment in safety cost the Douglas Aircraft Co. between 3 and 4 million dollars and the airlines between 10 and 12 million dollars, the greatest single investment in safety in aviation history. That all the groups participating are convinced that the DC-6 is worth such a phenomenal additional cost is the greatest possible proof of their faith in this giant airliner and a singular tribute to Douglas engineering and construction of aircraft. And no better testimony to this faith can be found than the recent order for 6 additional DC-6 transports by United Air Lines, whose DC-6 it was that plunged into Bryce Canyon, Utah on October 24, 1947 and precipitated the most intensive safety engineering program in a single airplane in aviation history.

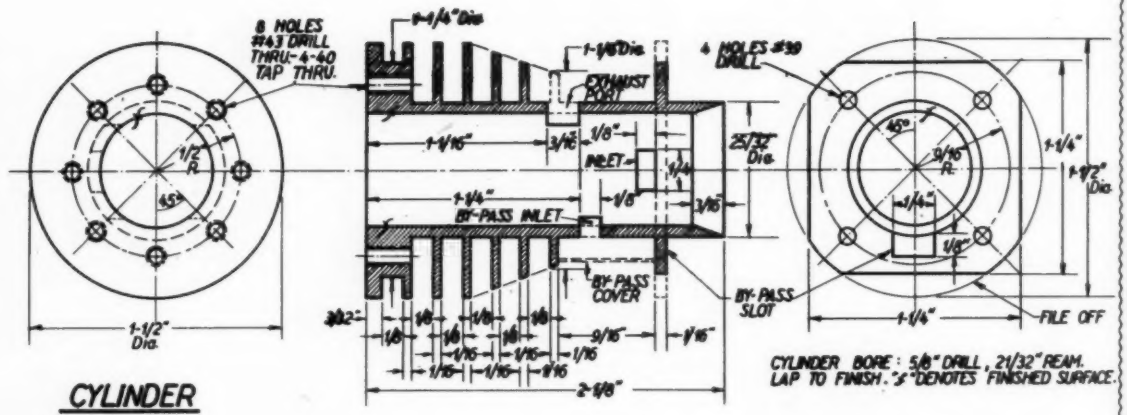
But United Air Lines is no stranger to the DC-6 nor to the unmatched performance record of Douglas transports. United was one of 5 participating airlines in the design, construction and test in actual service of the first modern 4 engine airliner in the U.S.: the Douglas DC-4, which first flew June 7, 1938. The following year United submitted the giant airliner, largest of its day, to actual transcontinental service tests along its *Main Line* route. Following redesign of the huge craft in order to more fully meet airline requirements, Douglas received orders for 40 of the new DC-4 transports when Pearl Harbor struck, and the plane donned warpaint and broke all existing air transportation records during World War II as the C-54 *Skymaster*. Not until after the war was won did United and the other participating airlines receive their DC-4 transports. But by then it had already been overshadowed in power, performance, capacity and speed by the new DC-6.

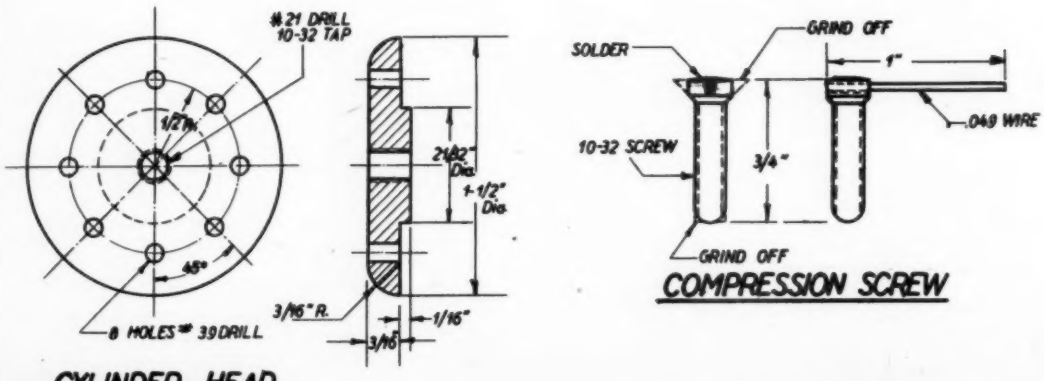
No sooner had the DC-4 been fully developed in its wartime job than Douglas engineers began to plan its postwar airline counterpart. The new model was to differ from the DC-4 in more powerful engines, pressure cabin, enlarged fuselage, thermal ice prevention in the wings and empennage, and improved landing flaps to provide for the increased weight of the design. Vitally interested in the new transport, the (then) Army Air Forces signed a contract with Douglas for delivery of 3 of the new types designated XC-112A. Work was accelerated on the new design and it made its first test flight on February 15, 1946. (The AAF contract was cut back to one airplane V-J Day and recently has been increased to 10 airplanes.)

Although it was not until a year later that first commercial deliveries of the new DC-6 were made, its introduction into service was dramatic. The first United *Mainliner 300* took off from Long Beach, Calif. on March 29, 1947 and flew non-stop to LaGuardia Field, N.Y. in 6 hours, 47 min., 13 sec. to establish a new transconti-

(*Turn to page* 36)

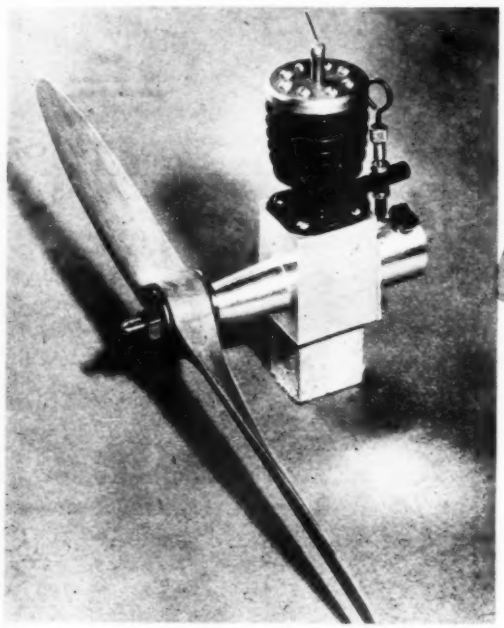

BORE FOR CYLINDER
25/32" DIA. 19/32" DEEP
4 HOLES #43 DRILL 1/2" DEEP
4-40 TAP 3/8" DEEP
1-1/4"
1/2" DIA.
A
A
1-1/4"
3/4" DIA.
9/16" R.
45°
17/32"
15/32"
1/16"
1-1/4" Square
1-3/32" Dia.
31/32" Bore
SECTION A-A
15/32" Deep
11/16" R.
45°
4 HOLES #39 DRILL
CRANKCASE COVER
CRANKCASE BORE
1-3/32" DIA. 29/32" DEEP
Section A-A
1/32"
THRUST FACE OF BRG.
BRONZE BRG. 3/8" O.D. 5/16" I.D.
5/16"
31/32"
3/8" BORE
1-19/32"
11/16" R.
45°
5/8"
1-1/16"
1-1/4"
2-5/16"
5/8"
5/8"
1-1/4"
4 HOLES #43 DRILL 1/2" DEEP. TAP 4-40 3/8" DEEP.
CRANKCASE
1-1/2"
31/32" O.D.
27/32" I.D.
1-7/16"
TANK

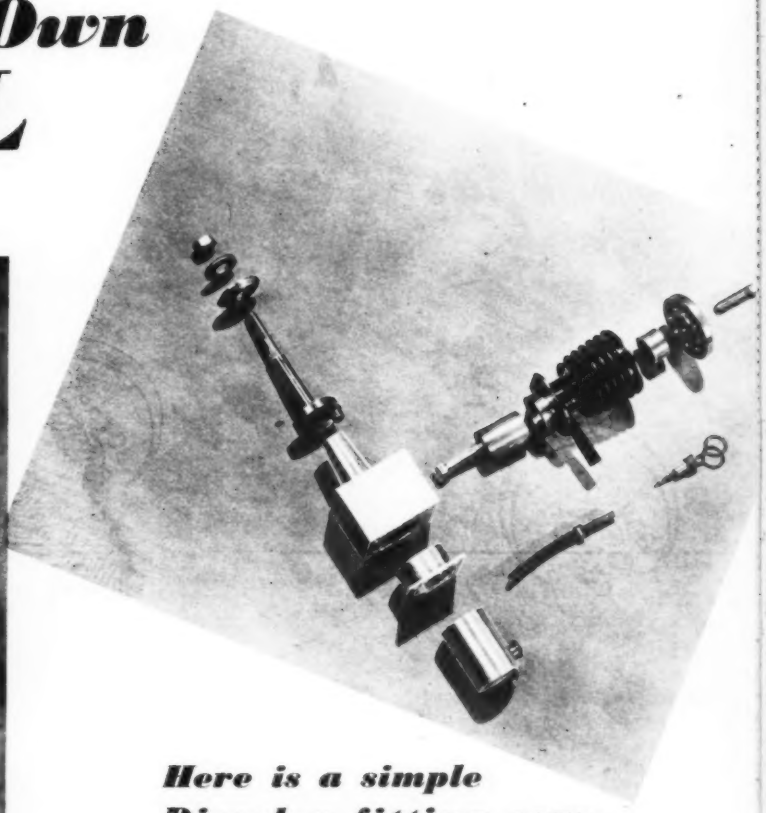

8 HOLES #43 DRILL THRU-4-40 TAP THRU.
1-1/4" Dia.
1-1/8" Dia.
EXHAUST PORT
1/8" INLET
1/4
3/16
1-1/16"
1-3/4" BY-PASS INLET
1/8"
BY-PASS COVER
25/32" Dia.
4 HOLES #39 DRILL
45°
1/2" R.
45°
3/16" R.
1-1/4"
1-1/2" Dia.
1/4"
BY-PASS SLOT
1-1/4"
FILE OFF
1-1/2" Dia.
.202"
1/8
1/16
3/16
9/16"
1/16"
2-1/8"
CYLINDER BORE: 5/8" DRILL, 21/32" REAM.
LAP TO FINISH. "S" DENOTES FINISHED SURFACE.
CYLINDER


#21 DRILL
10-32 TAP
1/2" R.
45°
8 HOLES #39 DRILL
21/32" Dia.
1-1/2" Dia.
3/16" R.
1/16"
3/16"
CYLINDER HEAD
SOLDER
GRIND OFF
1"
.049 WIRE
10-32 SCREW
3/4"
GRIND OFF
COMPRESSION SCREW

Build Your Own DIESEL

by JAMES NOONAN





***Here is a simple Diesel—a fitting companion to our* Simplex 25**

PART I

ALTHOUGH this motor has somewhat crude outlines, its construction is simplified purposely so that the average modeller possessing a lathe and drill press can build it without buying much more than a few drills, taps and reamers which he probably has on hand anyway. After machining, the parts may be filed to a pleasing rounded contour; lug or radial mounting may be used as desired.

The motor has a 21/32" bore and 23/32" stroke which gives a displacement of 0.29 cubic inches. It will turn a 14" prop and is ideal for stunt or free flight models.

Before you start work, check your lathe to make sure the tailstock is not offset enough to cause a taper. Do this by taking a cut the full length of an aluminum rod 9" to 12" long mounted between the centers, and check the diameter at each end with your micrometer. If the two readings differ, reset the tailstock until the best possible accuracy is obtained.

Rather than specify tolerances, dimensions are given in inches which may be translated into decimals from the table you should have on your workroom wall, or in the handbook of tables which comes with most lathes. Work to dimensions, fitting each part carefully as described. We assume you have a working knowledge of your tools and only ask that you work thoughtfully, slowly and carefully, following each step as outlined.

CRANKSHAFT BEARING—Select a piece of bronze about 1/2" dia. and 3" long. Mount in the three-jaw chuck and turn to 7/16" dia. Allowing 1/32" for the wider thrust face of the bearing, cut in and turn to exactly 3/8" dia. Cut off to an overall length of 1-1/2".

CRANKCASE—Purchase or cut from scrap a block of aluminum roughly 2"x2"x3". Select good quality, non-porous metal; cast metal is sometimes full of pores and holes, which may show leaks and make the finished piece useless.

Secure the block in the four-jaw chuck and turn one face true. Now rechuck with the trued face toward the chuck and turn the opposite face smooth. Proceed to turn all faces flat, checking constantly with a square and working the whole block down to 1-1/4" x 1-19/32" x 2-5/16".

Sharpen a piece of drill rod for use as a scriber and, using the square, lay out the centerlines on *all* sides of the block. Use a center punch to *very carefully* mark the center for the cylinder bore on top of the block, and to mark the crankcase bore on front and back of the block. These points are now center drilled on the drill press or in the lathe.

Lay out the circles (with a divider as a compass scriber) to locate the tapped holes for mounting the cylinder and rear cover plate. Punch each center very carefully. Now mount the four-jaw chuck and a center on the lathe spindle. Move the tailstock center up and, using centers to hold the block true, tighten the chuck jaws; then back the tailstock away. Start the lathe to check for trueness. Loosen two adjacent jaws of the chuck and remove the block, knock out the center, then replace the block. It should seat perfectly on the ground faces of the chuck, and the center should be retained exactly. Check this carefully.

Bore the crankcase by using the following steps:

1. Run a 1/4" drill through the block. Work slowly, backing out the drill frequently to clear the hole of chips, and lubricate well.

2. Follow with 23/64" drill in the same manner.

3. Ream very slowly with 3/8" reamer. This finishes the bore for the crankshaft bearing and gives a start for the crankcase bore.

4. Using larger drills and finishing with a boring bar, finish the crankcase bore. Check depth with a scale and diameter with internal expanding gauge or calipers, taking a reading by miking the gauge.

5. Insert bearing, which must be a very tight fit; tap in with light strokes of a lead mallet until it seats tightly on the face of the crankcase bore.

6. Now drill through bearing successively with 3/16" drill, 1/4" drill and 19/64" drill.

7. Ream bearing with 5/16" reamer, pushing the latter through very slowly and with the lathe running at high speed, to obtain a very smooth surface.

Loosen two jaws of the chuck and reverse the block (the back should now be facing the chuck) carefully centering as before. Check for true running and turn down the bearing housing to 3/8" dia. It may be tapered as shown, if you like. Take a cut off the front to remove the excess bronze bearing protruding from the crankcase.

Note before removing crankcase from chuck that the drawings show it 1-1/4"

(*Turn to page* 59)

Wing Tips and Taper

by GEORGE H. TWENEY

Those who want the utmost from their models will find here some valuable wing shape hints

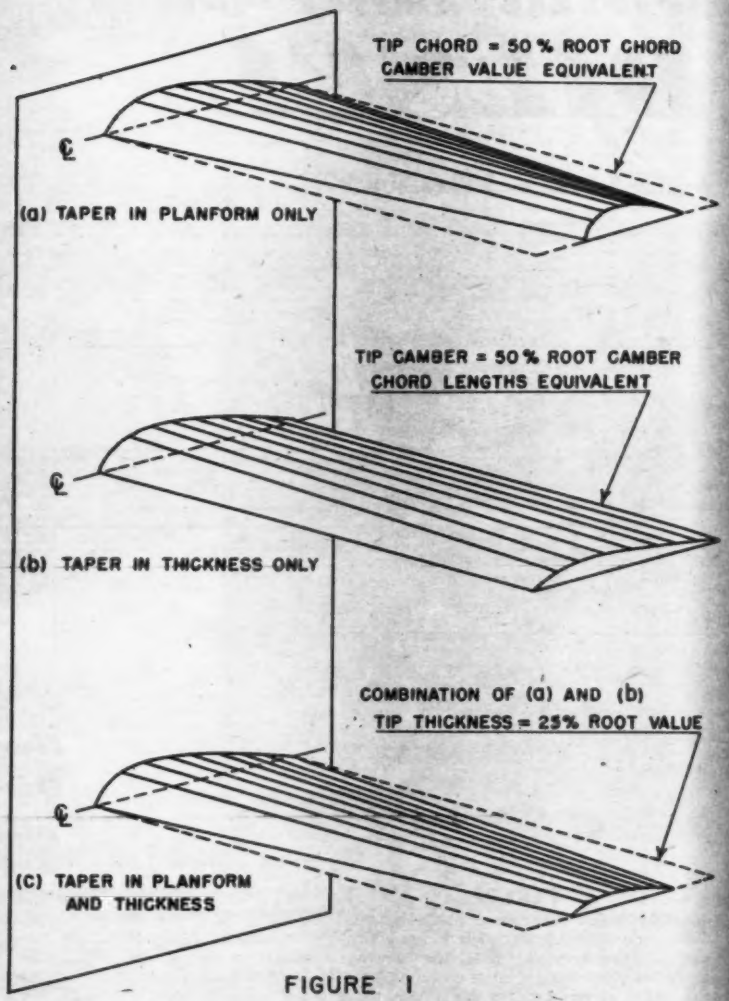

TIP CHORD = 50 % ROOT CHORD
CAMBER VALUE EQUIVALENT
(a) TAPER IN PLANFORM ONLY
TIP CAMBER = 50 % ROOT CAMBER
CHORD LENGTHS EQUIVALENT
(b) TAPER IN THICKNESS ONLY
COMBINATION OF (a) AND (b)
TIP THICKNESS = 25% ROOT VALUE
(c) TAPER IN PLANFORM
AND THICKNESS

FIGURE 1

THIS article is intended to point out the advantages and disadvantages of tapering airfoils and of changing the shape of the airfoil tips.

The wing may be modified, not only in the shape of the crossection but also in planform—that is, in the shape as viewed from above. It has been found that there are certain aerodynamic advantages to be gained by tapering an airfoil from the centerline, or as it is sometimes called, "the root section." Some improvements in airfoil characteristics are gained when the tapered wing—which makes the airfoil chord shorter at tip than at center—is used. Tapering is beneficial only if kept within reasonable limits; a wing tapered to a point at the tip, for example, would not be so efficient as one with no taper at all. There are in general 3 methods of tapering an airfoil:

(a) *Taper in planform.* This is done by reducing the chord from root section to tip. The airfoil remains the same at every point, but actual thickness of the wing is decreased, since the values of the upper and lower cambers remain unchanged.

(b) *Taper in thickness only.* In this case, the chord at the root and tip is the same. Values of the upper and lower cambers for the tip section are those of the root section reduced by a constant percentage.

(c) *Taper in both planform and thickness.* All of these tapers are illustrated in detail in Fig. 1.

The aerodynamic advantages gained are offset by the fact that the tapered wing presents certain structural difficulties. In the tapered wing every rib must be built on a different jig, and the spars must also be tapered. Both these considerations increase the difficulty of construction and the designer must use his judgment in determining whether or not the aerodynamic advantages gained by using the tapered wing are offset by the increased complications. It is usual to make the wing in such a manner that lines joining the points of maximum upper camber in each section will be horizontal; this will make the lower surfaces of a tapered wing slope upward to the tip. The decrease in chord length at any section is to the total decrease as the distance from the root out to that section is to the total distance from root to tip. It is becoming more customary to change the airfoil section from root towards the tip. By doing this it is possible to reduce the twisting action of the air.

Tapered wings are slightly better aerodynamically than rectangular wings, the improvement being more marked at high speeds. The big advantage of tapering wings, however, is in the structural weight, the weight of a well tapered wing being only 50% to 60% of a rectangular wing of the same span or area. In the tapered wing the increased chord length at the root is accompanied by increased thickness so that the spars may have their greatest depth where the bending moment is a maximum. The center-of-pressure travel, between given values of the lift

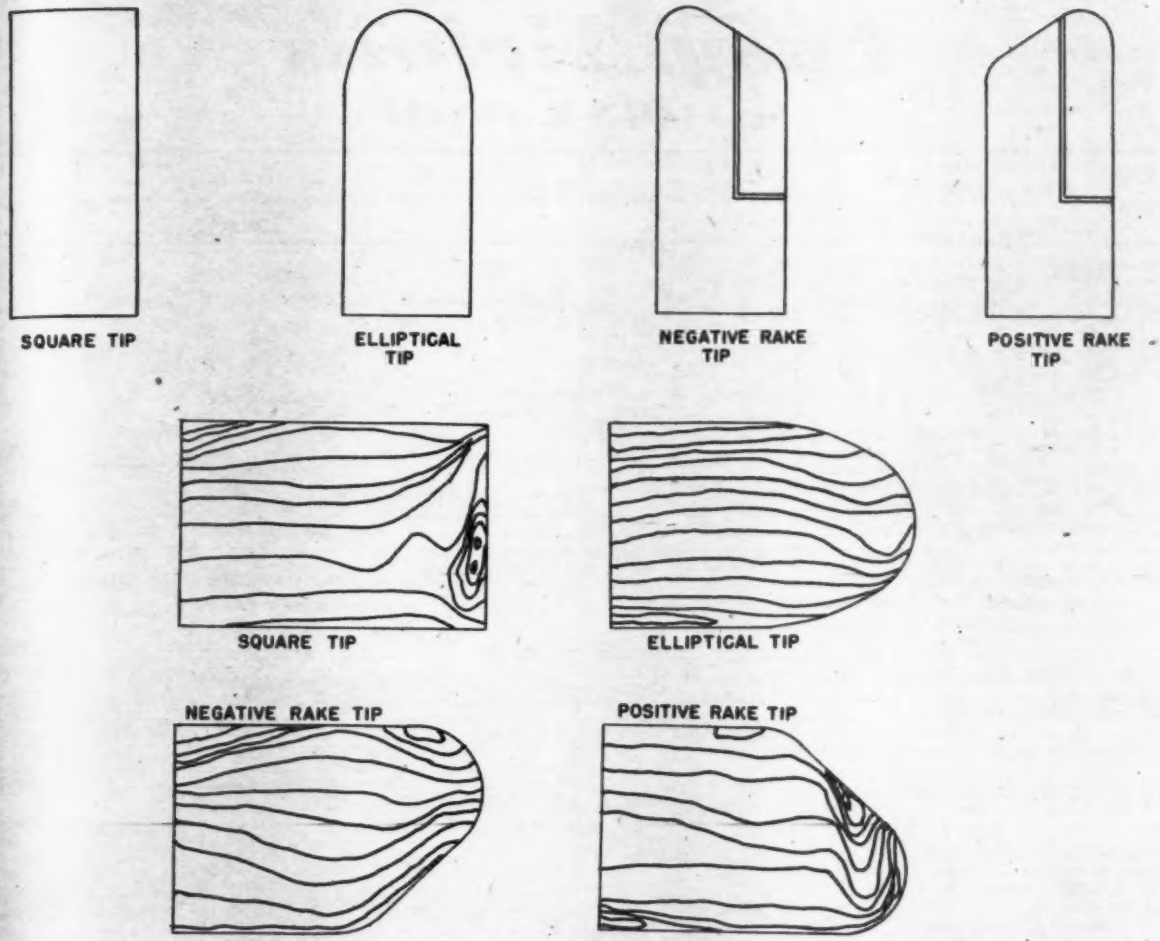


FIGURE 2

LIFT DISTRIBUTION FOR EQUIVALENT FLIGHT CONDITIONS

coefficient, is somewhat larger for the tapered airfoil. It will be noted that the resultant lift force on half the airfoil of the tapered wing is closer to the centerline of the airfoil at all angles of attack than it is for one of rectangular planform. This means that:

(a) Such an airfoil should require a slightly lighter structure for the same strength.

(b) An airplane using such a tapered airfoil for a wing should be easier to control laterally than one using the rectangular airfoil. This has been proved in test flights.

The airfoil with such a taper in planform is superior to the one of rectangular planform and constant thickness in that it gives:

(a) A higher maximum L/D.

(b) A higher maximum lift coefficient.

(c) Higher values of L/D at the larger values of the lift coefficient, giving an airfoil that is better for climb.

The distribution of lift along the span for the airfoil tapered in thickness only, and the lateral center-of-pressure positions are similar to those for the airfoil with taper in planform. Characteristic curves for the airfoil of constant section and rectangular planform and for an airfoil which is tapered to 25% thickness at the tip show the following comparisons:

(a) Decreases the minimum drag.

(b) Decreases the maximum lift.

(c) Increases the maximum L/D.

(d) Increases the values of L/D at small values of the lift coefficient.

(e) Travel of center of pressure between given values of the lift coefficient is not so great.

A taper to 25% thickness at the tip would in actual practice give a wing with too flexible a wingtip.

Use of taper both in planform and thickness gives the advantages of both, and with careful design gives airfoils that are slightly better than those of the other two classes. In any case, the taper must not be such that excessively thin tips result. Wingtips that are flexible and twist easily are very apt to give trouble in flight.

Wing Tip Shapes

Another change that can be made in the planform of a wing is in the shape of the tips, the simplest and quickest construction being to cut the tips off square. Shape of the airfoil tips has but an inappreciable effect on the airfoil's lift and drag characteristics, but a change in shape of the wings is important for other reasons. There are, in general, 4 types of tip shapes: square, elliptical, negatively raked, and positively raked. The difference in tips can best be studied by the distribution of pressure over them. The drawings in Fig. 2 show the pressure distribution at an angle of attack of 16° for the 4 types of tips. It is at once apparent that the square and the positively raked tips are unsatisfactory because of the uneven character of the pressure distribution, and the presence at the extreme tips of a high

(*Turn to page* 38)

Easy Airfoils

by JAMES R. CUSTIN

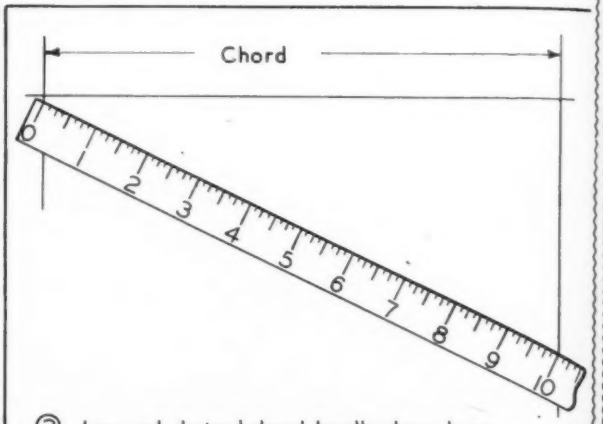
N.A.C.A.-M6

%	UPPER	LOWER
0	0	0
1.25	1.97	-1.76
2.5	2.81	-2.20
5.0	4.03	-2.73
7.5	4.94	-3.03
10	5.71	-3.24
15	6.82	-3.47
20	7.55	-3.62
25	8.01	-3.71
30	8.22	-3.79
40	8.05	-3.90
50	7.26	-3.94
60	6.03	-3.82
70	4.58	-3.48
80	3.06	-2.83
90	1.55	-1.77
95	.88	-1.08
100	.26	-0.26

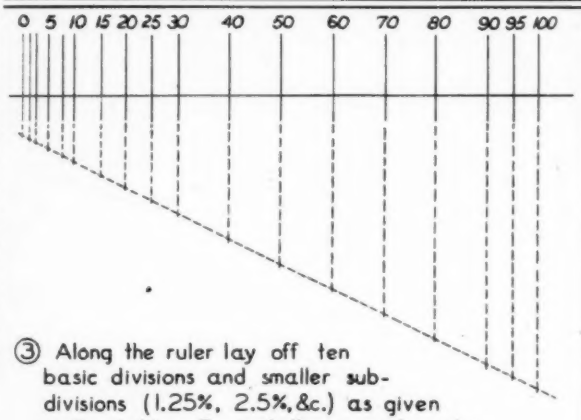
CLARK Y

%	UPPER	LOWER
0	3.50	3.50
1.25	5.45	1.93
2.5	6.50	1.47
5.0	7.90	.93
7.5	8.85	.63
10	9.60	.42
15	10.68	.15
20	11.36	.03
30	11.70	0.00
40	11.40	"
50	10.52	"
60	9.15	"
70	7.35	"
80	5.22	"
90	2.80	"
95	1.49	"
100	.12	"

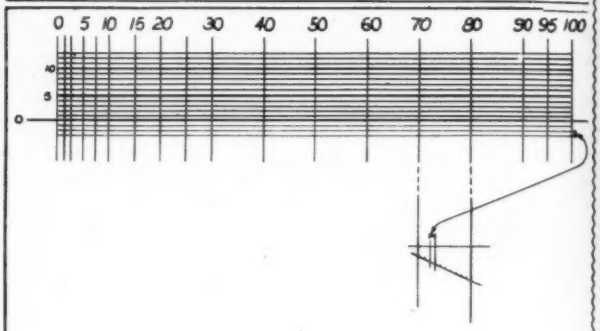
① All figures in a table of airfoil ordinates are in percentages of the chord dimension; hence with a table an airfoil can be plotted to any size.



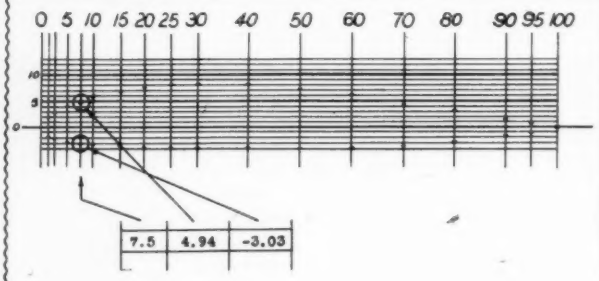
② Lay out desired chord length along base line. Set ruler slantwise so that ten units fall between projected chord extremities.



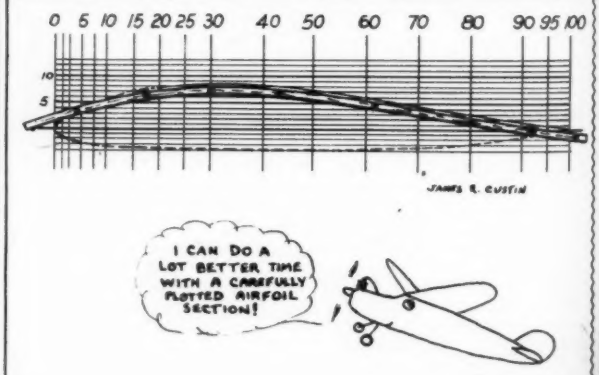
③ Along the ruler lay off ten basic divisions and smaller subdivisions (1.25%, 2.5%, &c.) as given in the table. Project these points onto the base line. Numbering the lines prevents confusion.



④ Using slanting ruler again find one-tenth of a basic division. This equals 1% of chord. With a divider prick these off along perpendicular to base line. Draw lines through points.



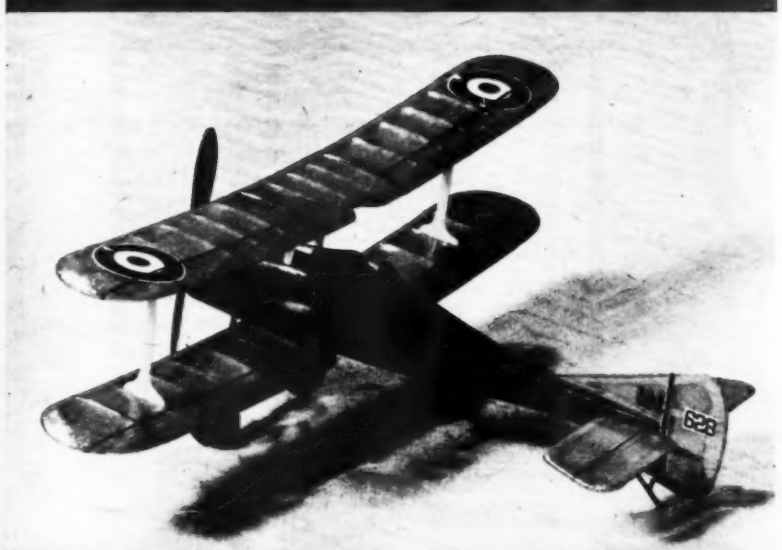
⑤ Plot points as given in the table. Estimate decimal parts. Negative numbers indicate points below the base line—e.g., -2.46 is two spaces and (about) one-half below base. Points shown plotted for N.A.C.A.-M6.



⑥ Connect plotted points with smooth line. French curve or thin balsa strip pinned down helps give proper curve.

SE-4 RACER

by JOSEPH H. WHERRY



The forerunner of the famous SE-5 pursuit, this ship was designed as a racer but is thought to have seen limited service in World War I

OUR WORLD WAR I model for this issue is a ship that has been overlooked by most, if not all, model builders. Therefore let's look over a few of the SE-4's salient points before beginning construction.

The letters *SE* do not, as is believed by many, stand for *Sopwith Experimental.* Instead *SE* stands for *Scouting Experimental;* the factory responsible was Britain's Royal Aircraft Factory which was established and operated much along the same line as is our own Naval Aircraft Factory. Other more famous designs of the R.A.F. (not to be confused with Royal Air Force) were the RE-8 (Reconnaissance Experimental which was produced in very large numbers and used on all fronts), the BE-2 series *a* to *e* (Bomber), and the BE-12 single place bomber-fighter. One must also remember that the renowned *SE-5*, one of the most famous fighters of all time, was also a product of the Royal Aircraft Factory; in fact the *SE-5* was a 1916-17 development of this same *SE-4* which we are about to model.

Early in 1914 the British Secretary of State for War was a Lt. Col. J. E. B. Seely. Col. Seely wished to establish a world's speed record with a plane from the R.A.F., so that organization was ordered to design and produce a plane for such an attempt. H. P. Folland, then Chief Engineer of the British Nieuport & General Aircraft Co. of Cricklewood, London, N.W. was retained as designer for the *SE-4* project. The ship took to the air just prior to the opening of hostilities. Little is available in the way of data on the *SE-4*, but we do know that it was powered by a 160 hp, 18-cylinder *Gnome* engine. The performance is stated as excellent; the plane climbed to 1,500 ft. in the first minute after takeoff and the top speed (at low attitude) was a good 135 mph.

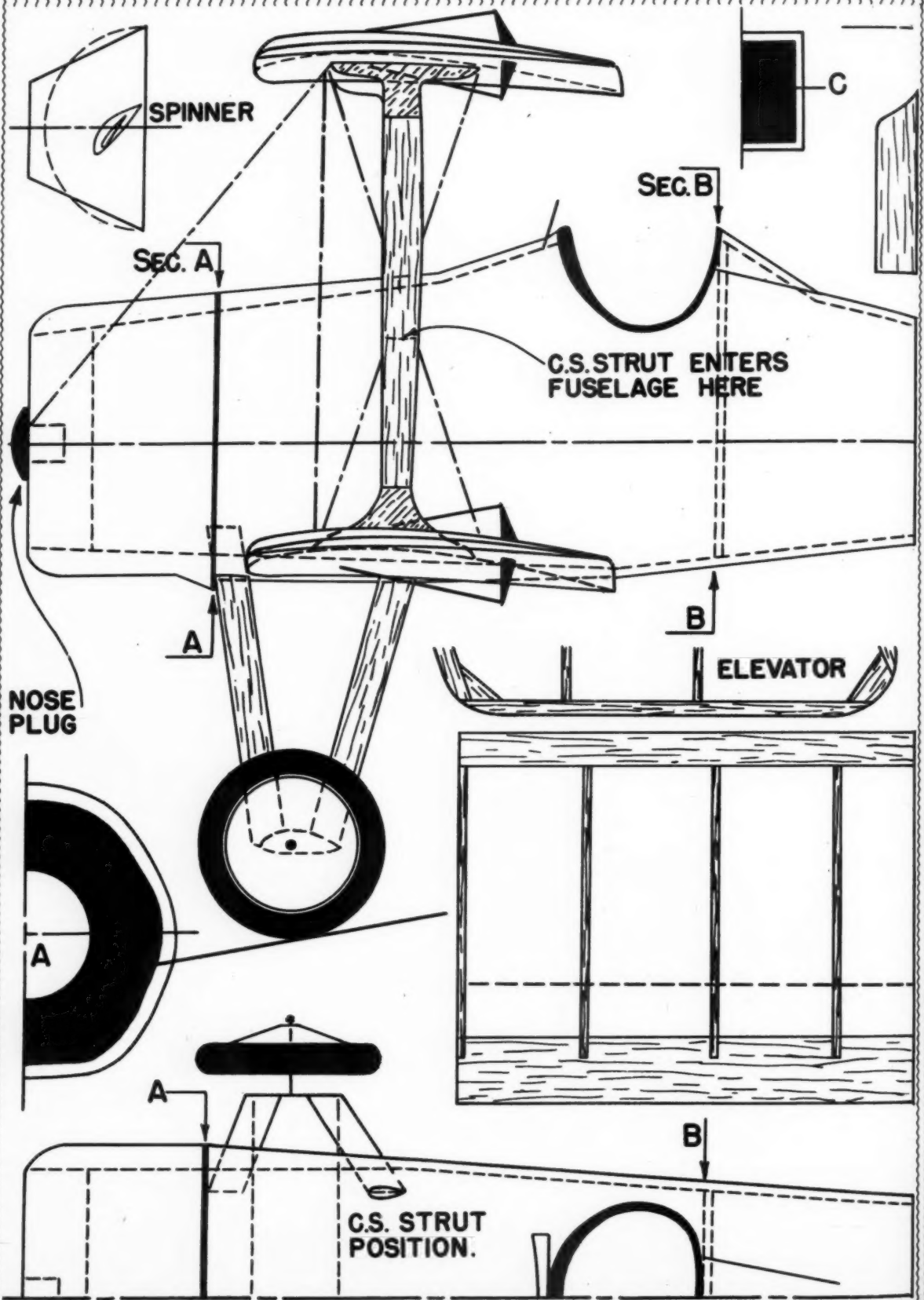
That was some speed for 1914; in fact the advanced monocoque design together with excellent overall streamlining leads one to wonder why the design was not further developed and placed in quantity production. For some reason or other the design seems to have been dropped, and aside from a 1914 citation in the House of Commons on its good qualities and performance, little more seems to have been made a matter of record for posterity.

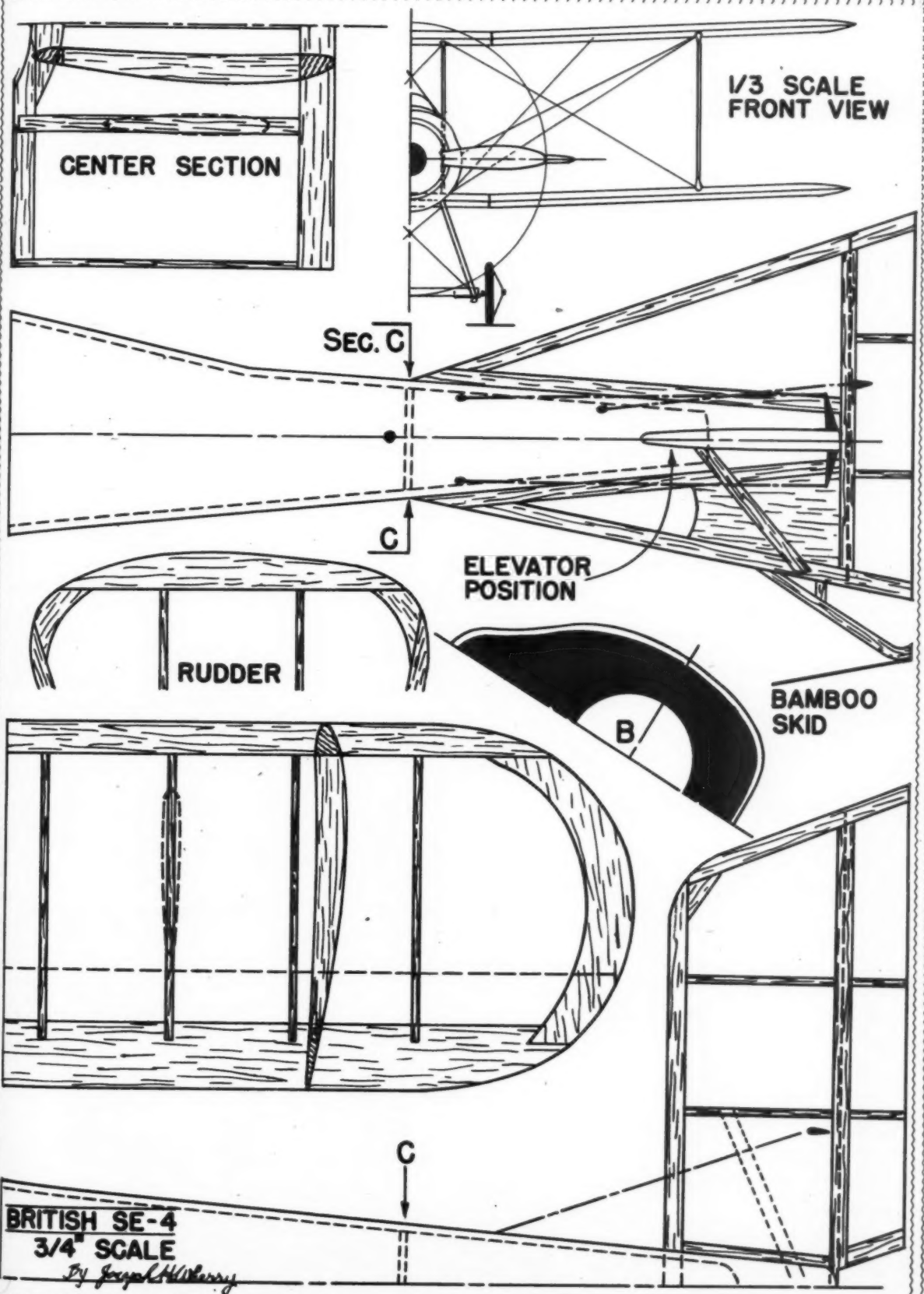
Data in the author's files shows the ship to be carrying the numbers *628* on the rudder. This particular *SE-4* was camouflaged, apparently, in the "sand and spinach" manner, so there seems to be some basis for assuming that the *SE-4* did see a bit of war service. How many were produced is not known at this writing, but it appears to have been a fine ship that was far and away ahead of its time. One unusual feature was the use of ailerons on both wings.

The model illustrated is to the scale of ¾ in. to the foot, so interested persons may determine any measurements by placing a scale on the plan and measuring directly.

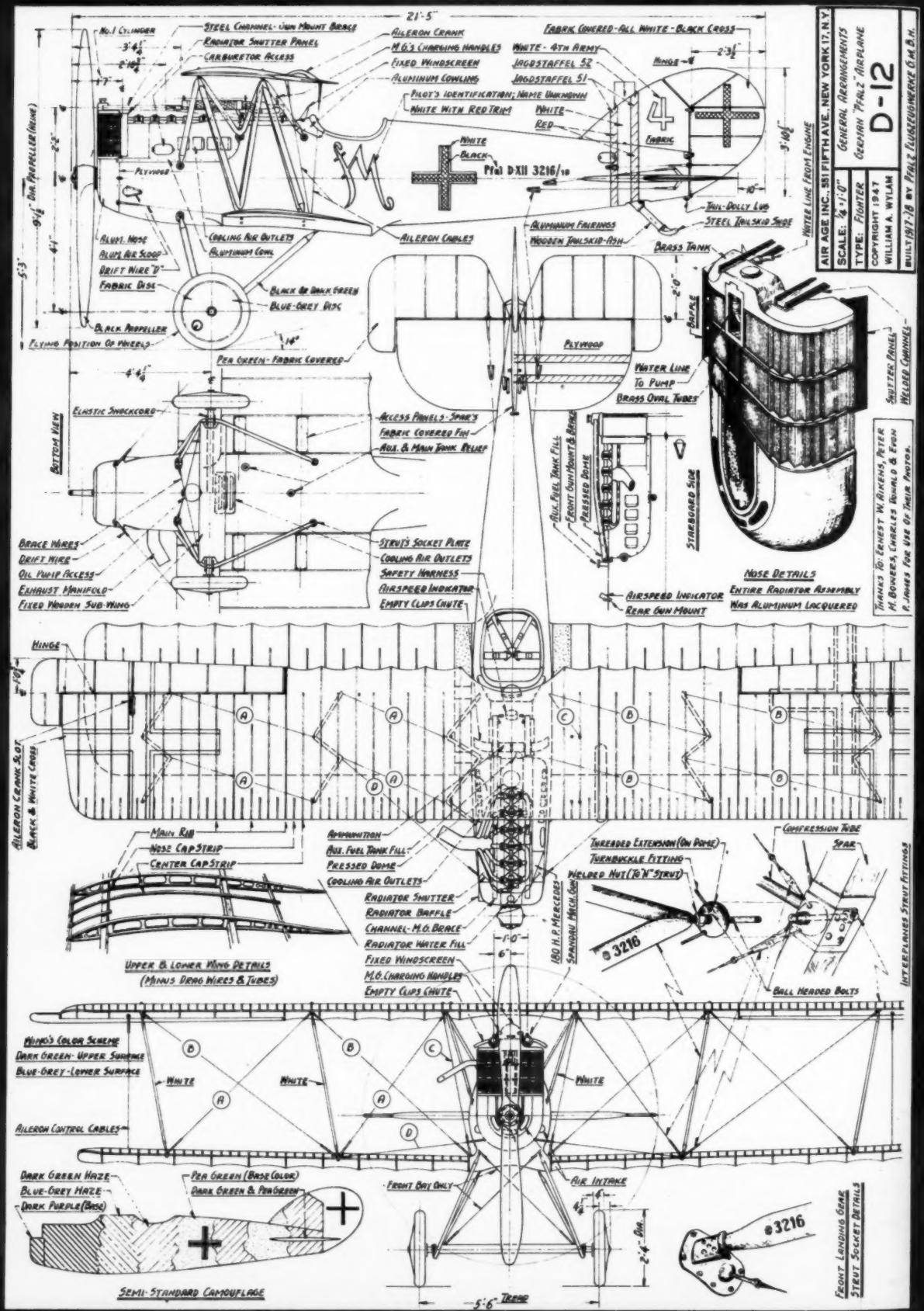
The lines of the fuselage are so sleek that the author decided on the hollowed-block type of construction. This results in little, if any, extra weight and the smooth and shiny results are well worth the effort. Select two blocks of medium weight balsa and cement together by spotting cement at regular intervals. Trace the side view outline to one side and band-saw to shape; likewise the top view. Note that the extreme nose is not quite round; rather it appears to be slightly oval and wider than it is deep by about ⅛ in. Sections A, B and C can be deter-

(*Turn to page* 55)


SPINNER
C
SEC. B
SEC. A
C.S. STRUT ENTERS
FUSELAGE HERE
B
A
ELEVATOR
NOSE
PLUG
A
A
B
C.S. STRUT
POSITION.


CENTER SECTION
1/3 SCALE
FRONT VIEW
SEC. C
C
ELEVATOR
POSITION
RUDDER
BAMBOO
SKID
B
C
BRITISH SE-4
3/4" SCALE
By Joseph H. Kerry

Further material on the PFALZ D12 will appear in the next issue



WYLAM MASTERPLAN

Breguet 14B.2 returning from a flight. Speed is fairly high as automatic flap has not yet dropped

WORLD WAR I

by ROBERT C. HARE

This Breguet was probably a trainer, as rear gun is missing

Trailing edge flap in lowered position—pilot had no control over it

PART 2

LAST month we discussed the Breguet model 14 and its several variations, learned something of its background, and covered a few details of its construction. But before we go on with an analysis of the Breguet's flight surfaces, let's take a look at its performance and flight characteristics.

Pilot's Viewpoint

The man who handles the controls is hard to please, as those of you who have had experience with full sized aircraft probably discovered. But imagine a pilot of 20 years ago—who didn't know too much about piloting—flying an airplane designed by men who were probing an infant science, and maintained by men even newer to aviation. Add the fact that this same pilot and airplane of 20 years ago flew into battle against other men and machines which were no further advanced in the art.

Under such conditions you can expect that the pilot of 1918 was mighty fussy—he had a right to be! It's no wonder that stories have come down to us about *crates* and *flying coffins*. The Breguet 14 series was no exception. By World War I standards it was an excellent airplane. But the men of 1917-18 who found fault with it and all the other ships since that day are the ones we have to thank for the excellence of our modern aircraft. Of such criticism is progress made, just as you criticize your newest model and build a better one!

How was the Breguet 14 as a "pilot's airplane"? If you could talk to one of those Breguet pilots he'd tell you that the early models were somewhat underpowered, sluggish on the controls. The early 275 hp *Fiat* powered Breguet climbed about 1,000 fpm. With the addition of power, speed was improved. With the 310 hp *Renault*, 370 hp *Lorraine* and 400 hp *Renault*, speeds were boosted to 114, 122 and 126 mph from the original 110 of the *Fiat* job, but at the expense of rate of climb. As with so many other planes of the period, authorities added more and more equipment and weight to the Breguet 14 with the inevitable results. Increased landing speed was another result; from about 40 mph in the

(*Turn to page* 48)

The NEW LOOK in Models

by GILBERT MacLEAN

BACK in the days when gas models first started to snatch trophies away from the rubber powered models, model builders were foot loose and fancy free as far as design was concerned. There was no rule-making body to tell them how much power they could use or how small their wings had to be. One's creative instinct found complete expression in all types of designs, giving the model plane enthusiast a wide range of experience and understanding. Then came the issue of danger and damage from gas models. It became necessary either to eliminate gas model flying or to establish rules that would prevent planes at least in most cases from wandering beyond the flying area. This was the objective of those who made the first rules. However, this objective has never been completely realized. Models still continue to fly away to parts unknown, and the ranks of our cross-country runners are still growing.

Attempts have been made during the last dozen years to restrain gas model flights without limiting the scope of design, but for one reason or another rules have either been a total failure in respect to restraining flights or they have restricted the design of planes to such an extent that at many contests one sees only one type of plane—usually this is the sky rocketing, fast climbing, lightly built pylon job. All this has taken the incentive out of gas model designing for at least 50% of the fans. Most of us do not like to be told what to do, especially when it comes to creating our brain children.

So it is not difficult to see that rule makers have a tough job. They first tried to restrain the flights of models by imposing a minimum wing loading rule. That is, gas models could not be flown in contests unless wing load was 8 oz. per sq. ft. of wing area or more. The purpose of this restriction supposedly was to prevent airplanes from reaching altitudes where thermals would carry them into the unknown. For a time this worked; but soon model builders learned how greatly to increase the performance of models with this wing loading; all they had to do was pack in greater power. This took planes to invisible heights regardless of the comparatively small wing area.

The rule makers had shut one door, so to speak, but had left open a second door of escape. *Wing loading* affects flight, it is true, but so does *power loading*. In fact, these two factors are the basis of airplane performance. The failure of the rules is due chiefly to the rule makers' inability to apply these two basic design factors properly. Why they do not achieve the desired result is a matter of conjecture, but we suspect most of them do not thoroughly understand the mathematical relationship existing in gas model design and how these two factors act to give one type of performance or another.

About nine years ago the rule makers evidently had some suspicion regarding the flight limiting qualities of the power loading factor: (pounds per horsepower or, in the case of gas models, ounces per cubic inches of piston displacement) because power loading limits were imposed as well as wing loading. In this way the poor model builder became completely "boxed in," and thereafter it was a matter of how tightly the rope was drawn around his neck. After any current year during which the art of model designing had advanced sufficiently to produce many out-of-sight flights, rules invariably were tightened; the minimum wing loading and the weight versus power factor were increased to reduce the flight capacity of planes and restrain their wayward instincts. However, in these attempts rule makers have never been completely successful, except in limiting design and taking the joy out of flying, because the rules discouraged all but one particular type of design. Anyone could win a contest who succeeded in reducing weight of the airplane's structure and using this saving to install extra power. In other words it became a problem of structural design rather than aerodynamics, because it was simpler to put in a big engine, cut down structural weight and produce a sky rocketing climb to high altitudes where the plane would ride the thermals for an indefinite time. This type of plane has been standard for years and as a result, chiefly due to the rules, model builders' ideas concerning design have atrophied.

It is not a matter of whether we shall have rules or not, it is a matter of the right kind of rules, because rules can be established which will not only restrain flight but will allow model builders to use every ingenuity to win contests; *rules that will not confine them to one type of design!*

What is the answer? Just this: to establish rules that will eliminate the *advantage* of high power and little weight. It is said that anyone can fly even a barn door provided enough power is applied. True aerodynamic skill can be brought out only by limiting the power to such an extent that model builders must draw upon their knowledge of aerodynamic efficiency to improve their flights.

This year the rule makers have attempted to change this because they have increased the power loading. Last year's models had to weigh 80 oz. for every cu. in. of piston displ.; this year they must weigh 100 oz. Evidently their idea is to restrain flight; but unless flight is restrained so that models do not fly away, any restrictions are useless and are only hardships. Those rule makers who wanted no limitations whatever have not only succeeded in achieving their ends but have also succeeded in defeating the purpose of the rules.

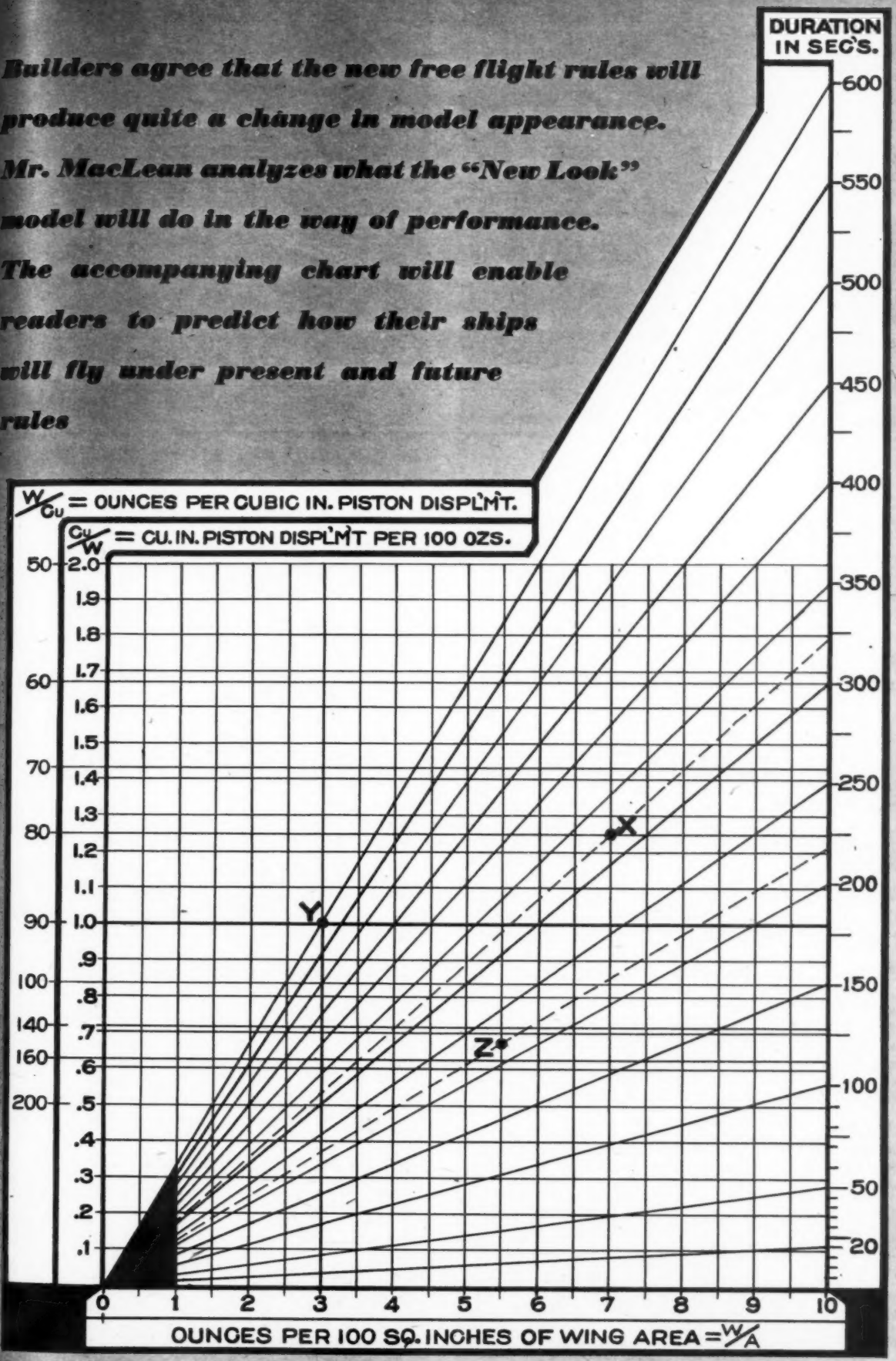
Now there may as well not be any rules so far as preventing out-of-sight flights is concerned: especially in light of the fact that they have taken off all wing loading restrictions. It looks very much as if the rules were the result of bargaining or compromise, with the same result as in the case of the fellow who decided to steer between the two approaching lights in order not to hit either one.

If rule makers are really sincere in their avowed purpose of restraining flight and yet allow a large scope of design, they can: first, impose a minimum 8 oz. wing loading rule; and second, a minimum power loading of 140 or 150 oz. per cu. in. piston displ., conditions represented by (Z) on the graph, page 29. This imposes the same problem on model buildings that confronts large aircraft designers; they must draw on their knowledge of aerodynamics and structural design as well in order to produce winning models. It brings model plane activities into the field of a *science* as well as a hobby.

Under the 1948 rules the sky is the limit. At least model builders can be thankful for the lack of restrictions. However,

(*Turn to page* 38)

Builders agree that the new free flight rules will produce quite a change in model appearance. Mr. MacLean analyzes what the "New Look" model will do in the way of performance. The accompanying chart will enable readers to predict how their ships will fly under present and future rules



No. 1 June Baker and Bruce Lester winding up the latter's rubber model

No. 2 D. W. Mercer and son Kent built this Cub for control line flying

AIR WAYS

News of Model Airplane Experimenters all Over the World

THE 1948 NATIONALS. Official word has been sent out by AMA headquarters that the Nats this year will be held at the U. S. Naval Air Station at Olathe, Kansas. Hold on! Before you start to complain of the Kansas winds, let us say we have been assured that Olathe is out of the "wind belt." The dates are Aug. 3-7, inclusive.

The contest will be jointly sponsored by the Olathe Chamber of Commerce and Earl Collier Post No. 153 of the American Legion. The Navy, while not an official sponsor, has shown the greatest of interest in the event. For the duration of the meet the 640 acre field will be given over entirely to model flying. The Navy will be able to accommodate 1200 male contestants at the field at the very nominal charge of 25c per day for lodgings. Also, meals at the regular Navy mess will be served to all comers at $1.00 per day.

The field is 4 miles from Olathe, where there are further hotel and rooming house accommodations, and is 18 miles from Kansas City. Indoor events will be held in the K. C. Municipal Auditorium which boasts a 96 ft. unobstructed ceiling.

Modelers will be interested to know that the R.O.W. event will be flown again this year; there is a 2 acre lake right on the field and retrievers will be equipped with outboard motor boats. In addition to R.O.W. and all the usual classes, the new CO-2 event will be an attraction.

These are the salient points received just before going to press. As soon as plans are further developed we will print more details; we understood that many new wrinkles are being worked out to assure a really outstanding event.

A SAFETY NOTE. As is the usual case when something new reaches the market, modelers have taken up the glow-plug engine with great enthusiasm. Since special fuels are in some instances required for proper glow-plug operation, many users of this style powerplant have tried working out their own mixtures. Word has gotten around that nitro-propane or nitro-methane are necessary ingredients in such fuels. While this is quite correct, we understand that the few sources of these ingredients have decided to refuse sales to the general public —not because the above substances are dangerously in themselves, but because the uninformed experimenter might mix them with other compounds with dangerous results.

Commercial fuel makers have asked us to bring the following safety precautions to the attention of users of ready mixed glow-plug fuels:

1. Never mix manufactured fuels with other substances unless the directions specifically suggest it.

2. Keep these fuels in their original containers or in glass jars. The fuel will corrode brass or copper fuel pumps and containers if stored in them.

3. Keep fuel off the skin. The methanol used in commercial mixtures is a poison, and persons with sensitive skin may be allergic to other ingredients.

4. Avoid breathing vapors of fuel, and do not operate engines in a poorly ventilated place.

5. Do not store fuels for prolonged periods in temperatures exceeding 110°F.

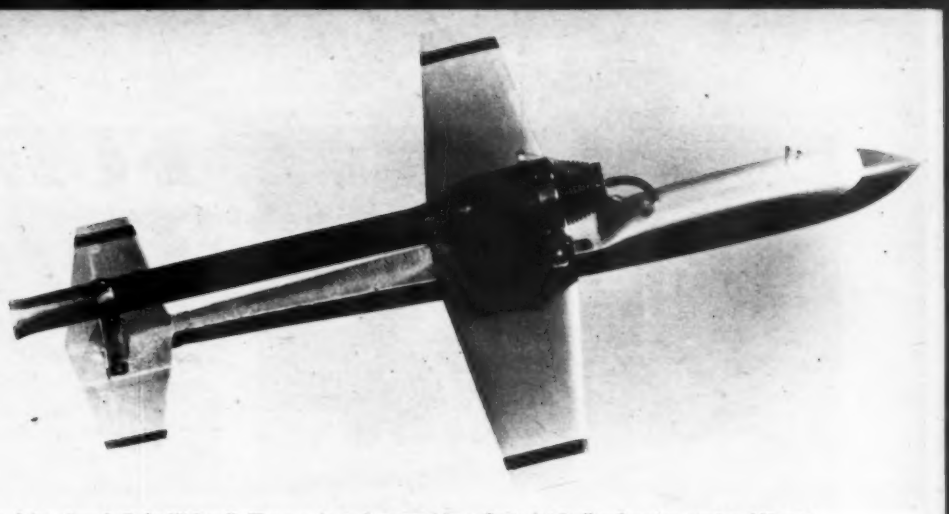
It will be seen that many of these precautions are quite as important regardless of what type engine or fuel you use, and

(*Turn to page* 62)

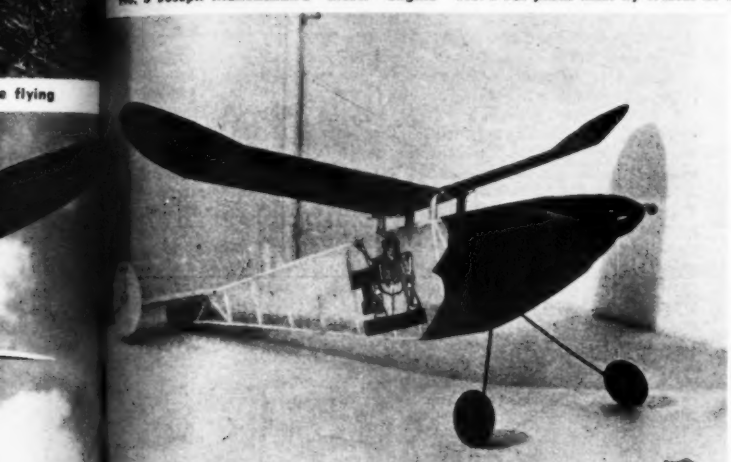
No. 3 Gilbert H. Minnigh's *Bantam* powered gas model of his own design

No. 4 Flying scale *Taylorcraft L2* constructed and flown by Bob Pfeiffer

No. 5 Joseph Mahonchak's "*diesel*" engine



No. 6 Jet plane built by Walter B. Thomas, Jr. and powered by a *Dyna-Jet Redhead* engine reaches 115 mph



No. 7 Blaine Parkin's 30" wingspan model photographed by D. P. Wilkinson

No. 8 *Jiminy Cricket*, a control liner submitted by D. W. Evans of England

No. 9 Herb Edgar's *Ohlsson* 23 powered control liner sports large floats

No. 10 Az-11 *Torenvalk* glider sent in by A. L. Aarts of Holland

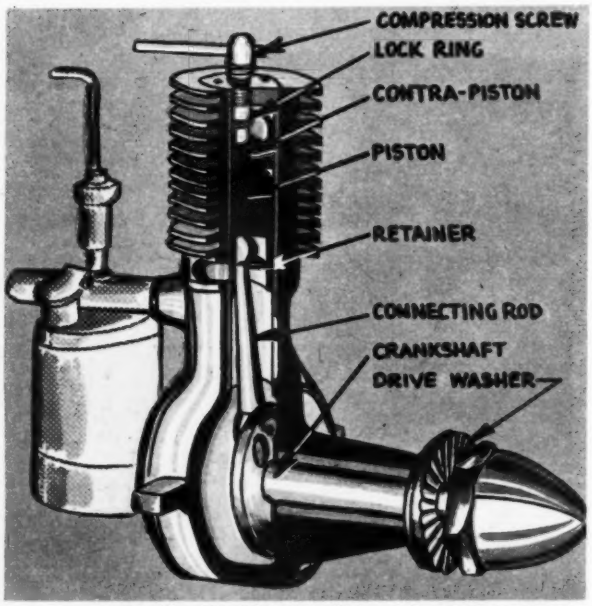
No. 11 *Arden* .099 powered control line pusher built by Don Longmire

No. 12 Robert Haack's beautiful scale model of the 1930 *Laird Solution*

FUEL FOR DIESELS

by JACK BAYHA

This particular model of the *Drone* has fixed compression



The *Micro Diesel* is typical of those with variable compression

Here we see the author working out some of his potent concoctions

NOW that our diesel model airplane engines are fast coming of age and reaching their proper place in the model world, we find ourselves giving more and more thought to fuels. In our opinion, fuel development has lagged well behind engine development here in the U. S. Only recently has any real progress been made even in Europe, where our tiny diesel—or more properly compression ignition engine—was developed. Being an avid diesel fan I decided to do some research work, and the results were very gratifying.

The first thing to be learned about a diesel engine is that it is nothing like a gasoline engine. In previous articles in MODEL AIRPLANE NEWS we made this point, and we'll make it again. As we all know, a term *Hi-Octane* is often applied to gasoline engine fuels; the higher the octane the better the fuel. Our diesel engines do not operate on a fuel's octane ability but on a quality—which is practically the opposite of octane—known as cetane. We could go on with technical terms all day long and only confuse you, so we'll stop at this point and ask you to bear in mind one thing: *Good gasoline engine fuel ingredients are usually poor ingredients for a diesel fuel!*

We decided that the logical fuel for a model diesel might conceivably bear some relation to the fuels used in diesel trucks, buses and boats. If you wanted to find out about diesel engines (full size ones) you would go to a diesel engineer, or a fuel expert. We did, and came away with a wealth of suggestions and a host of fancy formulas. Some had promise and some wouldn't work at all. Those which worked had definite reasons why they were a success; as for the failures, we can't say—they just didn't work.

Suppose we look over the qualifications of a good model diesel fuel. The first requirement is

IGNITION ABILITY—Our diesel fuel must be able to fire at a low enough temperature to ignite readily when the engine is turned over in a starting flip. This means that we must use one ingredient in any blended fuel that will make this fuel easy to fire. But, our fuel must display another important characteristic——

IGNITION RETARDING—A low firing point fuel ingredient all too often shows a very sorry characteristic; it fires when it reaches the firing temperature, whether the piston is at the top of its stroke or just on the way up. Once it gets hot enough it fires. This causes so-called pre-ignition to occur; the engine knocks badly and puts out very little power. Finally, unlike full size true diesel engines, we must have another quality——

VOLATILITY—Our fuel must be capable of turning into a combustible vapor, so that it can be transferred to the engine firing chamber when needed. This is not necessary in a true diesel, where the fuel is forced into the cylinder through a high pressure jet system to vaporize it.

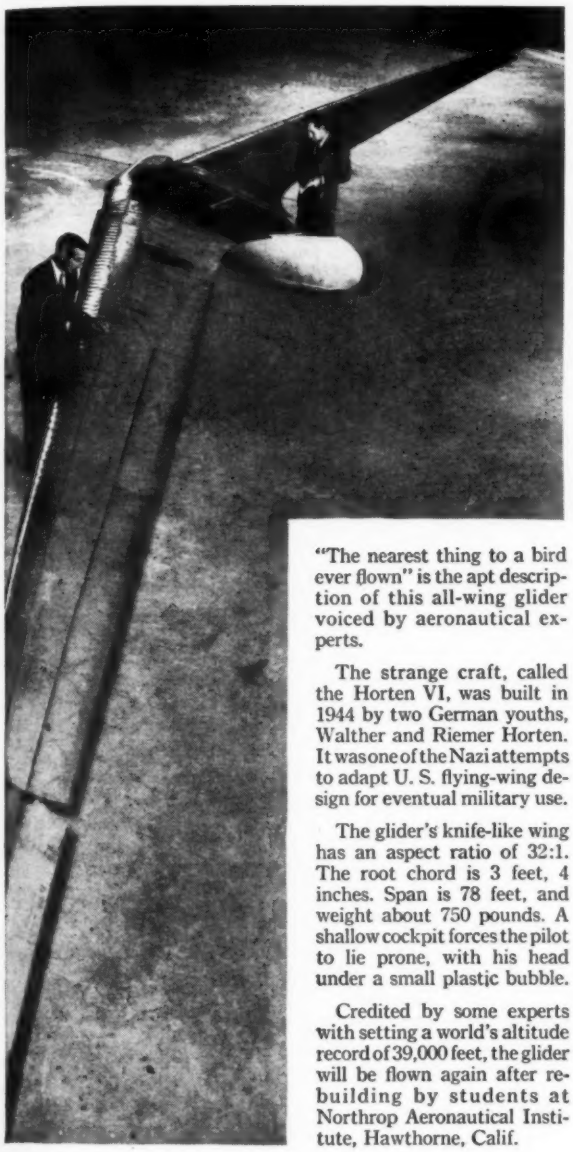
As we look at these three requirements we find that no one substance will exhibit all the necessary qualities. This leads us to conclude that the answer to our fuel problem must lie in a blend of several ingredients and not in one alone. (You will note that we have omitted oil, the lubricating agent, from this discussion at the present.)

In the past we have recommended a mixture of 75% ether and 25% oil. We still recommend this as a good reliable fuel, easy to mix and with good operating characteristics. It is however expensive, and is not the best fuel that can be used for several reasons. It will knock, showing that its ignition delay is inadequate at some needle valve adjustments. We might add that this knocking, or pre-ignition, will ruin the main bearing of any motor in a short period. And it is not always easy to start with in cold weather.

One excellent commercial fuel has neatly avoided these two problems. Borgë Jacobson, a young Danish diesel engineer, has developed a so-called *Catylytic Fuel!* This fuel is based on Jacobson's actual full size diesel engine experience, and relies on the use of some additive agents used for full scale motors. We hazard a guess that it is probably a peroxide compound. This substance will liberate a great amount of oxygen when it breaks down and fires, and this adds power and low temperature performance to the fuel. The fuel also apparently uses

(*Turn to page* 57)

CAPTURED GERMAN ALL-WING GLIDER



"The nearest thing to a bird ever flown" is the apt description of this all-wing glider voiced by aeronautical experts.

The strange craft, called the Horten VI, was built in 1944 by two German youths, Walther and Riemer Horten. It was one of the Nazi attempts to adapt U. S. flying-wing design for eventual military use.

The glider's knife-like wing has an aspect ratio of 32:1. The root chord is 3 feet, 4 inches. Span is 78 feet, and weight about 750 pounds. A shallow cockpit forces the pilot to lie prone, with his head under a small plastic bubble.

Credited by some experts with setting a world's altitude record of 39,000 feet, the glider will be flown again after rebuilding by students at Northrop Aeronautical Institute, Hawthorne, Calif.

Being Analyzed by Students in Engineering and Mechanics Classes at Northrop

The picturesque craft shown at the left was captured in Germany during the war, sent to Wright Field, and more recently turned over to Northrop Aircraft, Inc., Hawthorne, Calif. Now it is a subject of study in the Aeronautical Institute division of the aircraft company. Engineering and mechanics students are studying and evaluating the glider's construction and aerodynamic characteristics: Data from the studies will be used in designing and building an all-wing glider as a student project.

This is typical of the practical and interesting assignments in Northrop training. Another project, a student-designed and built twin-boom pusher type monoplane, is fast approaching the flight test stage. Many other day-to-day shop and laboratory assignments are provided by wind-tunnel models, mockups, and experimental aircraft–all transferred to the Institute from the Northrop research and development laboratories. Both engineering and mechanic students enjoy the extraordinary privilege of contact, in this way, with latest developments in design and construction.

The technical institute conducted by Northrop, famous as builders of the spectacular Flying Wings, is located in the midst of the company's busy center of aircraft research, development, and manufacturing. The students were among the first to see the great 8-jet Flying Wing and viewed its first take-off from the mile-long Northrop Field runway at the Institute's "back door."

The Northrop school is one of the few technical institutes offering an aeronautical engineering curriculum approved by the Engineers' Council for Professional Development. Its Aircraft and Engine Mechanics course is approved by the Civil Aeronautics Administration. Both types of training are open to both veterans and non-veterans. Classes start at frequent intervals. Graduates hold important positions with many leading aircraft and airline companies throughout the world, besides being employed in Northrop's own plants.

NORTHROP
Aeronautical
INSTITUTE
Division of Northrop Aircraft, Inc.
1507 E. Broadway, Hawthorne, Los Angeles County, Calif.

AERONAUTICAL ENGINEERING–2-Year Course. With advanced standing, course can be completed in less time. Curriculum approved by Engineers' Council for Professional Development. Also available, 8-weeks Pre-Engineering "prep" and "Refresher" course.

AIRCRAFT & ENGINE MECHANICS–50 weeks course prepares for A & E license. Approved by Civil Aeronautics Administration.

Approved for Veterans

Send Coupon for Complete Information ➧

NORTHROP AERONAUTICAL INSTITUTE,
1507 E. Broadway, Hawthorne, Los Angeles County, Calif.

Please send me the Institute catalog and complete information, including starting dates of classes. I am interested in

☐ Aeronautical Engineering

☐ Aircraft and Aircraft Engine Mechanics (A&E)

Name

Address Age

City Zone State

Check one: ☐ Veteran ☐ In service ☐ Civilian

MEGOW MODELS

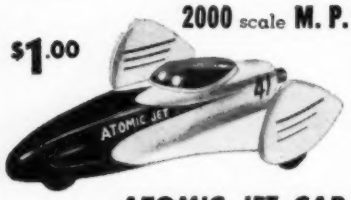
READY-TO-FLY

Less Power Plant

CO2 SPECIAL $1.50

2000 scale M. P. H.

$1.00

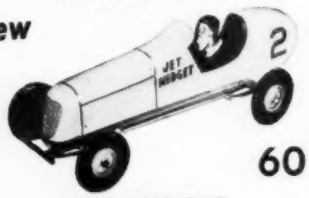


ATOMIC JET CAR

CONTENTS

CARVED BODY — METAL WHEELS
METAL AXLES — BUBBLE CANOPY
ALL PARTS SHAPED — RACING LUGS & DECALS
EASY CONSTRUCTION PLAN

New



60¢

JET MIDGET

CONTENTS

One piece shaped body — Metal Axles.
Die cast steering wheel — Metal Wheels.
Lugs For Wire Racing. — Printed sheet Decals
Easy Construction Plan

JET GUN

All metal 35¢

1. Self centering hole for Jet Tube.
2. Powerful tension spring.
3. Colett chuck on plunger for releasing needle.
4. Use any standard phonograph needle.
5. Efficient as one can be made.

$1.95

SKY STREAK

Lic. under J. Walker "U" Control Pat. No. 2,292,416

All parts carved and shaped ready for assembly

BUILD AND FLY IT IN 4 HRS.

UC-2 Tyro	3.50
UC-4 Bantam Special	2.75
UC-5 Competitor	5.50
Battery Boxes	.40
Switches	.30

SEE YOUR DEALER If your dealer cannot supply you send 10% postage and order direct.

THE MEGOW CORPORATION Philadelphia 22, Pa.

WEST COAST TIPS

by JOHNNY DAVIS

HOORAY! Somebody finally broke down and sent us a report from the North that wasn't a mimeographed paper (which same is sent not only to our boss but to every other publication in the country). Our hat is off to Roy Bitters, the faithful president of *Fresno Control Fliers*, for being the trail-blazer in correspondence.

We receive many letters each month asking for information concerning this and that phase of modeling (mostly from fellows who want to go fast, incidentally)—but as a rule the only other information that comes to us is the mimeographed reports from the *Northern California Aero Modelers* and the *Oakland Cloud Dusters'* letter, ably published and reported by "Mom" and "Pop" Robbers. Don't stop the reports, folks, just 'cause they are mimeographed. But how about a little something which you won't read in every other magazine a month or so later—we like to give the fellows a little something extra. Come on, snow us under! We dare you!

Anyway, the column this month is hereby named "Fresno's Column of the Month" . . .

First of all, the *Fresno Control Fliers* have acquired a field that includes 3 circles for control line flying. But Roy Bitters apologizes that they haven't really done much yet. Listen, Mr. Bitters, any club that has a field big enough for 3 circles which they can use when they want to and not have somebody come along and say, "You have to do this and that or else no flying"—well, *any* club that is in that beautiful position should not apologize to any one. We would hate to have to make up a list of all the "hot shot" fliers in Southern California who belong to "hot rock" clubs and who haven't *any* place to fly, period, paragraph. So don't you Fresno fellows get downhearted on that score. Now that you have a place to fly you will get there with the rest of them in due time.

Incidentally, Ray Snow, whom we know only slightly, is due for the bows concerning the *Fresno Fliers* park. Their field is a part of Ray's "Hornet Hobby Park," located at Church & Chestnut Aves. There are also facilities for running rail and cable race cars, and at present there are no restrictions on noise up to and including jets, and none are contemplated. The field is located 2-1/2 miles southeast of Fresno.

Roy tells us a good sized crowd of spectators turns out whenever they have something doing. On Feb. 21 and 22 they had a big rail and cable prototype meet, which drew quite a few spectators.

The further we read on in Roy's letter the better it gets. He says that a hard top surface is in the offing for their speed circle and that sprinklers have been laid in the precision circles with grass being planted this spring. Oh, happy day!

Here's some news: The *Fresno* club, which is sponsored by the Fresno Jr. Chamber of Commerce, will hold a big invitational meet this summer. (P.S. Roy, get us reservations.)

Roy also says here that Jim Whitlatch is a member of their club. Why, we know Jim from 'way back. At last year's All Western Open, Jim won first place in the Senior Class B (V) Speed event at 107.33 mph and placed second in Class C (VI) Senior with a speed of 101.86 mph. He was 6th in Senior Sweepstakes and beat out a lot of hot boys including Lew Mahieu and Bill Tharp. He earned a trip back to the Nats, but had already planned to drive so he passed it up. The *Fresno* club has plenty of right to be proud of Jim who will certainly be one of the contenders for top honors this year.

Bob Fritz, vice pres. of the *Fresno* club, has perfected a wing for stunt work which really will swap ends. He always turns out nice stuff and is considered to be a top stunt man in that territory.

Roy mentions a "Junior," Howard Petri, who is an excellent builder and flyer. His

Jack Douglas and his charming wife with group of winners at '47 Western Open. (Hal Yeager and Owen Jacobsen hold trophies they won.) Jack is one of the two newly elected rules committee members for South Western AMA District; other member is "Pop" Robbers of *Oakland Cloud Dusters*

Horace Sowell warming up *Curtis Hawk P6E* with *Atwood* engine. Horace is active in Donal Hogan's *El Paso Model Airplane Club*, well known to fliers on the West Coast

specialty (it says here) is to fly about 12 in. off the ground *upside down*—wow! He should be in the *Snafu* club where he would feel right at home. Lansberg has nothing on him.

Ralph Allred flies an *Atwood* powered *Acrobat* around at all the meets and usually wins all the Senior hardware. Incidentally, this fellow Allred builds a beautiful airplane model too. Which is a hint to you boys who want to win—you don't have to build them pretty, but it helps.

Paul Nieto, an old standby from days gone by, is the Senior AMA Leader Member in Fresno and usually acts as Contest Director, besides helping at all the Sunday meets. We know the type. He spends so much time helping everybody else that he never gets a chance to build or fly his own stuff.

Write in again, Roy—any time—we'll print it!

An orchid for Roy Snow, who not only built the "Hornet Hobby Park" and set it up right but also lets the modelers use it rent free and really boosts any kind of modeling. We could stand a Model Park in a few other large cities (whose initials are L.A., S.D., and S.F.) Catch!? (Mr. Snow manufactures the *Hornet* engine.)

Recently we journeyed to Van Nuys to watch the free flighters go at it. Just another Sunday of flying. Fellows out having a good time—a few spills, a little excitement now and then, but nothing startling going on. Just a swell day.

'Way over at one side we noticed two fliers setting up a Y-shaped contraption, and a big model sitting alongside of them. We went over to have a look, and it turned out to be Dick Schumaker and his partner Herb Owbridge with their radio job. By the time we got there they were almost ready to start proceedings. First they checked all the radio equipment to make sure everything was functioning properly; then they checked the engine. Finally Dick started the engine and away she went.

Now we know what they mean when they say flying can be fun. Dick and Herb had more fun, real enjoyable fun, than you can have with a control line job or a free flighter in 10 years.

They had *complete* control over that ship. Up, down, right and left turn, motor control, and motor shut-off! Man—what more can you ask!

They did figure eights, 180° overhead approaches, spot landings, and they could have done acrobatics if they felt like it. We absolutely have never seen such a successful flight with radio control, including the flights we witnessed at the Nationals. There was never a hitch of any kind. It was just a magnificent demonstration of controlled flight. And they did it with only *one escapement!* They were flying a big ship, but they had a *five-footer* in the car which was ready to go except for a battery or some such small detail!

Well, we are positive of one thing. The future growth of the model hobby will be the "best years of all our lives" when radio really takes hold.

Dick and Herb had one of the Good Bros. sets in their big ship, and one of the *Aero Spark Aerotrol* sets in the little one. Either set complete runs around $50 to $60 which isn't bad for the fun you have.

We went home all fired up with radio terms coming out of our eyes like sparks; we put the heat on a model building friend, Harry Rogers, who is constructing an R.C. job at the present time, to hurry up and get it finished.

About two days later, we ran into Virgil Clark, one of the old V-G boys. He is hot on R.C. and is right on the throes of development now. So in the next All-Western Open it is our prediction that there will be plenty of activity in the R.C. event.

Some good fields on which to fly—no restrictions on noise—no mufflers required:

1. Elysian Park, near downtown Los Angeles.
2. Huntington Park, at the corner of Florence and California, in Huntington Park. (Home of the *Huntington Park Model Engineers.*)
3. Tweedy Park, on Tweedy Blvd. off Atlantic. (Home of *South Gate Model Club.*)
4. Santa Monica, 14th and Colorado. (Home of *Bay City Modelers* and *Santa Monica Model Airplane Club.*)
5. Beverly Hills High School, off Wilshire. Near L.A. Country Club.
6. Rose Bowl Parking Lot. Pasadena Rose Bowl.
7. Redondo Beach Model Club, Redondo Beach (new Club).
8. Woodrow Wilson High, Long Beach. (Home of *Lakewood Model Club.*)

Laugh of the Week—Ed Sharp, in connection with publicity on his new metal airplanes, recently sent his little Class III *McCoy 29* job over to Phoenix to be flown by proxy by Jim McElroy. Jim didn't want to take a chance on ruining Ed's good prop, which held the record at 133.91 mph, so he carved another one. On the 3rd flight with his own prop, Jim clocked in at 136.21 mph! So now Jim holds the record with Ed's airplane but with his prop. They tell me that McElroy has been going around foaming at the mouth since that flight. Well, we know how he feels. We can't wait to get our mitts on one, either.

* * *

Flash!! The North came down and conquered the South over the weekend. Casualties were heavy and the damage inflicted is as yet undetermined! The invading forces in the persons of Wayne Matthews and E. V. Huth arrived early and soon had the situation well in hand. The event? Record trials at the Western and Rosecrans Dust Bowl, home of the *LAAM*. The speeds, way up out of sight and then some.

Wayne Matthews' single-bladed *Hornet* powered speedster wound itself up to the unbelievable speed of over 150 mph. The official speed is not out yet since it will be calibrated back at AMA headquarters, but it will be in the neighborhood of 151 plus.

Mr. Huth also showed the boys something new when he took his *McCoy 49* powered Class C (new Rules) job and turned 138.99 mph. This time is also to be calibrated but will be right around 139 mph.

While this was going on the Southern boys were in their doing their darndest, but the speedsters from Alameda were not to be denied. Keith Storey, Ed Sharp, Don Newberger, Wally Wallick, Bob Thomas, Roy Gregson, Royce Childress, Bud Jamieson, Clarence Benskin and others, all names to be reckoned with when the subject is speed, looked on with helpless envy as "Dirty Shirt" Matthews and his partner Huth took over. The best the Southerners were able to muster was Don Newberger's 145 plus with his new all-metal job. The rest of the boys bogged down in the dust and went home to lick their wounds for next time.

So long, fellows, see you next month!

NEW! Most Complete Book on Model Motors!

Gives complete coverage of every phase of model motor operation; also helpful tables, charts, superb drawings; & large photo section of: American gas, jet & diesels, foreign diesels.

"Thorough, well-illustrated."—*Aero Digest*

"Data tables contain more detailed information about the dimensions, performance and construction of American-built model engines than heretofore has been published in tabular form."—*Aeronautical Engineering Review*

228 pages, 6 x 9 inches. Beautifully bound in cloth and gold stamped. **$3.00**

Order from your dealer or direct from AIR AGE, INC., 551 Fifth Av., New York 17, N. Y.

DEALERS!

If You Want The *Right Answer*— *Ask Douglas Model Distributors!*

AIRPLANES?

Douglas Model Distributors can answer your questions! Jack Douglas, wartime U. S. Marine Aviation; U. S. Navy Civilian Ground School Instructor; Aircraft Mechanic; Intermountain Empire Newspaper Aviation Editor. Mrs. Jack Douglas—wartime WASP pilot.

RAILROADING?

Douglas Model Distributors can answer your questions! Jack Douglas, former Brakeman, Rio Grande and Union Pacific Railroads.

SHIPS?

Douglas Model Distributors can answer your questions! Jack Douglas, sailor on the saltiest water on earth — Utah's fabulous Great Salt Lake.

MODEL BUILDING AND FLYING?

Douglas Model Distributors can answer your questions! Jack Douglas, builder for 23 years—prize winner in every field of modeling: Gas Free-Flight, Gas U-Control, Scale, Rubber, Solids, Gliders. Model railroader for 10 years; ship modeler for 15 years.

MODEL BUSINESS?

Douglas Model Distributors can answer your questions! Jack Douglas, newly elected A.M.A. Contest Board Member; model manufacturer since 1930; owner largest Intermountain Model Shop, the Douglas Model Aircraft Company since 1931 and wholesale model distributor since 1938.

***NOW!* Exclusively Wholesale!**

At the Crossroads of the West — Featuring the nation's finest lines with COMPLETE STOCKS at FULL DISCOUNTS to dealers!

Send Your Order Now—Same Day Service!

DOUGLAS

***Model* DISTRIBUTORS**

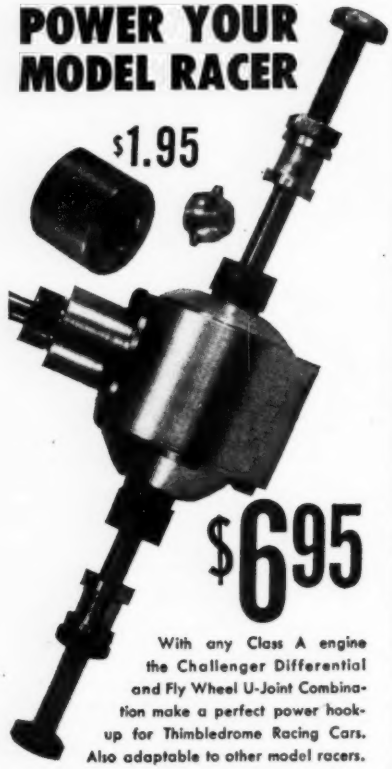
133 EAST 2nd SOUTH

SALT LAKE CITY, UTAH

OUT SOON! Our new 1948 SUPER CATALOGUE! Write for YOUR copy.

POWER YOUR MODEL RACER

$1.95



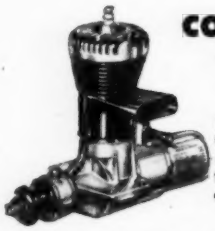
$6.95

With any Class A engine the Challenger Differential and Fly Wheel U-Joint Combination make a perfect power hook-up for Thimbledrome Racing Cars. Also adaptable to other model racers.

Differential is precision machined from Dural with case hardened steel gears and naval bronze bearings. Housing is 1 1/2" in diameter, axle 6 1/8" long, drive shaft 1 3/4" long.

Write for Descriptive Literature

At Your Hobby Shop or Sold Direct Plus Postage



CONTESTOR

$18.50

An engineering triumph in the Class C field. Your money can't buy better performance or finer dependability.

LUCAS & SMITH

MANUFACTURING CO.

2636 HUMBOLT ST. • LOS ANGELES 31

Douglas DC-6

(*Continued from page* 17)

nental record for commercial airliners; this plane was piloted by Capt. W. E. "Slim" Learned. In the following months United received 35 of the luxurious new DC-6 transports, 25 day planes and 10 sleeper plane versions. These 300 mph liners went into service on United's New York-San Francisco, Washington-San Francisco, Boston-San Francisco and San Francisco-Honolulu routes.

Never before has there been such an airliner: automatic cabin pressurization, reversible pitch propellers to brake the landing run, a total of 8400 hp in 4 Pratt & Whitney R-2800 *Double Wasp* engines, "hot wing" thermal de-icing for wing, tail and windshield, extensive use of 75S high-strength aluminum alloy, jet thrust exhaust system adding 25 mph to speed, revolutionary wing flap system increasing wing lift for slow landing, complete air conditioning of both temperature and humidity, radiant wall cabin heating, electric propeller de-icing, preloaded cargo containers, fogproof and frostproof passenger windows, seats convertible to berths in 30 secs., ground air conditioning system, etc.

The wingspan is 117 ft. 6 in. and the fuselage is 100 ft. 7 in. long. The airplane stands 28 ft. 5 in. high. The fuselage is almost circular, having a vertical diameter of 11 ft. 6 in. and a horizontal diameter of 10 ft. 5 in. The cabin is 9 ft. wide, 7 ft. high and 63 ft. long divided into a forward cabin seating 36 passengers and an aft cabin seating 16. This 52-passenger version features a men's lounge forward and women's lounge aft. A 56-passenger version locates both lounges forward with a 20-passenger aft cabin. The sleeper version accommodates 26 passengers.

The pressurized cabin preserves the low altitude high pressure in the interior for passenger comfort while the airplane itself is flying at high altitude low pressure. For example, the plane can cruise at 16,000 ft. (where the pressure is only 16.21 in. Hg. and the temperature only about 2° F) while the cabin is at an equivalent altitude of 5300 ft. (where the pressure is about 24.61 in. Hg and the temperature is maintained at 68-72° F in winter and 74-78° F in summer).

Air conditioning of the pressurized cabin is accomplished by parallel heating and cooling systems. The heating system incorporates an internal combustion heater which supplies warm air throughout the cabin floor, walls and ceiling. The cooling system utilizes an air-cycle refrigerating unit consisting of an intercooler, expansion turbine and axial flow fan. Mixing of this warm and cool pressurized air is done by automatic control.

Alclad 75ST is used for the entire skin of the airplane as well as many structural members of the fuselage, wing and tail. The result of seven years' research, 75S has a 20% greater tensile and 50% greater compressive yield strengths than the popular 24ST used in all-metal structures for a decade. The DC-6 uses the same wing as the wartime C-54, but substitution of 75S has not only greatly increased its strength but actually saved about 800 lbs. per plane.

The 4 Pratt & Whitney R-2800 *Double Wasp* engines develop 2100 hp at 2800 rpm for takeoff and are rated 1800 hp at sea level. United uses 55% rated power for cruising (1000 hp) and 75% rated power for climb (1350 hp). The exhaust stacks from the 18 cylinders are grouped into two recessed jet exits, one above and one below the wing, to utilize the extra thrust of the system, which provides 5-10 mph at cruising speed and up to 25 mph at maximum power. The carburetor air intake separates water from the air, permits the use of anti-icing fluid and is fitted with a special hot air valve to maintain proper carburetor intake air temperature.

Propellers are Hamilton Standard Hydromatic, full-feathering reversible pitch designs 13 ft. 1 in. in diameter. The reversible pitch feature permits a material reduction in the landing roll of the airliner and improves maneuverability on the ground, actually enabling the craft to be backed up into a hangar! An automatic electrical synchronizing system maintains identical speeds on all 4 engines, eliminating the familiar throb of unsynchronized multi-engine planes.

The DC-6 is the first airliner to utilize heat anti-icing of the wing and tail. Three internal combustion heaters, one located outboard of Nos. 1 and 4 engines and at the root of the tail fin, heat incoming air and ducts conduct this heated air out along the wing and tail surfaces, thereby heating these surfaces and preventing ice formation. In addition, this heated air is conducted between the double panes of the pilot's windshield to prevent ice formation. The propellers are electrically heated for anti-icing protection.

The fuel system has a capacity of 4201 gal., sufficient for a non-stop range of 4150 miles. Each engine has its own fuel supply; two 508½ gal. integral tanks in the center wing and two 349 gal. integral tanks in the outer wings. In addition, there are two 431 gal. auxiliary tanks in the center wing, a total standard capacity of 2577 gals., enough for a flight of 2540 miles. The remaining 1724 gals. may be carried in collapsible synthetic rubber auxiliary cells mounted in the inner wing. Each tank is provided with electric centrifugal booster pumps to permit fuel pumping at high altitudes and fuel transfer between tanks at all altitudes.

While the DC-3 electrical system is capable of generating 2800 watts of power and the DC-4 of 11,200 watts, the new DC-6 system provides 33,600 watts power. Although much of this is reserve capacity, it is provided by increased generator power rather than increased storage battery capacity. Each engine drives a generator, the supply from which is carried separately to a central bus protected by insulating covers to prevent any possibility of a short circuit. All connections to it are made through circuit breakers or high capacity fuses, a total of 160 of the former and 10 of the latter being carried in the airplane varying from 3 to 600 amperes. The system is a 24 volt one-wire grounded type with the generators having a capacity of 350 amperes at 28 volts. The entire electrical system may be operated by any 2 of these generators, minimizing the effects of engine failure. The electrical system weighs only 683 lbs., made possible in part by use of aluminum wire instead of copper in many portions. One of the unusual items in the system is a set of Thyratron tubes so sensitive that altitude pressure changes indicated by currents of as low as 0.00013 ampere actuate the cabin conditioning system. Two 400-cycle, 115 volt alternating current inverters are used to provide both single and three-phase supply to the radio equipment and the flight instruments.

A unique feature of the DC-6 is a series of 8 wire baskets, each capable of handling 450 lbs. or more of mail or cargo, mounted laterally across the belly under the cabin floor. A basket, for example, can be labeled "Chicago" and installed

and removed as a unit with all its contents untouched. Passenger baggage is carried in the front cargo pit for ease of handling.

The DC-6 has a 312 mph cruising speed at 19,600 ft. at a gross weight of 73,000 lbs., and 301 mph cruising speed at 19,400 ft. at a gross weight of 84,000 lbs. at maximum cruise power. It climbs at the rate of 1650 ft. per min. at sea level at a weight of 73,000 lbs. and 1310 fpm at 84,000 lbs. It can climb on only 3 engines at the rate of 1020 fpm and 780 fpm at the two weights respectively. It takes off at sea level at a gross weight of 73,000 lbs. in a distance of 3150 ft., and at a weight of 84,000 lbs. in 4460 ft. With the aid of water injection, these distances are reduced to 2900 ft. and 4030 ft. respectively.

Following the tragedy at Bryce Canyon intensive investigation revealed the cause as an odd series of circumstances no designer or operator could possibly have predicted. While transferring fuel from the No. 4 alternate tank to No. 3 alternate tank (to even their supply as is customary while in the air), the latter tank was inadvertently overfilled with the excess being forced out the vent line into the air beneath the wing. About 10 ft. aft and slightly to the left of this vent line is the cabin heater air intake. The fuel vapor entered this intake, caught fire in the heater and the flames circulated through the heating system, causing the holocaust. A similar set of circumstances produced a mid-air fire on an American Airlines DC-6 on Nov. 11, 1947 but fortunately the plane was landed safely at Gallup, N.M.

Following extensive study of these accidents, the DC-6 design and numerous tests, a special safety board made up of government, airline, pilot, Douglas and other experts recommended a large number of changes in the airplane designed to prevent not only a similar occurrence but any possibility of future fire damage. Douglas has made all of these extensive changes in a total of 146 DC-6 transports at its own expense, and many of them have been returned to the airlines and are now back in service. Chiefly, these changes centered about the heating system (relocation of air intake, relocation of fuel tank vents, use of stainless steel in the combustion heater area, relocation and redesign of fire detection and fire fighting equipment and controls, etc.). The first completely modified DC-6 was approved after Douglas flight tests late last Feb. and modifications on the remaining airplanes are now nearing completion.

As a result the Douglas DC-6 is now the world's safest air transport, for none other has ever received the close scrutiny of every minute item of equipment on board that has this giant craft. Proof of the airlines' faith in the postwar liner is the continuing receipt of orders for additional planes even during the grounding period. Although the heaviest loser in the unfortunate series of circumstances, United Air Lines has lost none of its faith in the giant craft, and its new order will swell its already sizable fleet of DC-6's to the largest in the world. The red, white and blue *United Mainliner 300's* will carry swift, safe air transportation forward another decade for the benefit of a peaceful flying world.

PHOTO CREDITS

Page		
2	*Above*	Sikorsky Aircraft Div.
	Below	Boeing News Bureau
17	*All*	United Air Lines
19	*All*	Les May Studio
27	*All*	Robert C. Hare

Crescent
OF CALIFORNIA

out of the West, comes the best

MORE stock and better service for your model needs at our new location! Our large selection of California merchandise and other top quality products is bigger than ever in our new shop—so we can now be even more help to you in selecting your model supplies.

MANY thanks for all the letters you have been sending us, and thanks in particular to all you servicemen. We are now equipped to serve you better than ever, and hope we will continue to hear from you.

Fastest service in the West—No free (?) goods—Guaranteed satisfaction.

Engines

*Dooling 61	$35.00
*McCoy 49	25.00
*McCoy 29	19.50
*Ohlsson 60	11.95
*Ohlsson 23	9.95
*Ohlsson 19	9.95
*Anderson Spitfire 60	24.95
*Fox 59	29.95
*Atwood Champion	17.50
*Madewell 49	12.50
*Contestor	18.50
*Cyclone 60	18.95
*K&B Torpedo 29	18.50
*K&B Torpedo 24	16.50
*Dennymite 59	6.95
Arden 099 PB	12.50
Arden 099 BB	15.50
*Sportsman Jr. 36	14.95
*Sportsman Sr. 55	16.95
*M. Midget G.P. 45	14.75
*K&B Glo-Torp 29	14.95
*Vivell Diesel 010	11.95

Control Line Kits

*Madman (C)	10.00
*Box Car Chief (C)	5.95
*Box Car (C)	5.95
*Casalaire (C)	14.75
Super Zilch (C)	4.95
Dmeco Special (C)	7.95
*Snafu Ercoupe (B-C)	9.95
*Snafu Typhoon (B-C)	10.95
*Snafu Zero (B-C)	9.95
*Skychief (B-C)	6.95
*Skeeter (B-C)	3.95
A. J. Fireball (B-C)	7.95
Capitol "400" (B-C)	4.95
Skybox Trainer (B-C)	3.95
Skybox Stunt (B-C)	3.95
Ryan Fireball (A-B-C)	3.95
Whippet (A-B-C)	3.95
Greyhound (A-B-C)	3.95
*Snafu Magician (B)	3.95
*Box Car Dinky (B)	4.25
Omeca Speedwagon	4.95
*British SE-5 (B)	4.95
Cyclone (B)	4.95
Nifty (B)	4.95
Zing (B)	4.95
Trainee (B)	3.95
*Fairchild PT-19 (A-B)	5.45
Lil' Zilch (A-B)	2.95
Hawker Super Fury (A)	2.50
*Fokker-"Tripe" (A)	3.50
Whirlwind Jr. (A)	2.95

Free Flight

Mercury (C)	5.50
Powerhouse (C)	5.95
Playboy Sr. (C)	6.00
Buccaneer Spl. (C)	6.95
Pacer (C)	4.95
Mercury Jr. (B)	3.95
Powerhouse (B)	4.95
Playboy Jr. (B)	3.25
Buccaneer Spl. (B)	3.95
Silvaire (B)	3.00
Wanderer (B)	3.50
Aeronca Champ (B)	4.95
Honey "B" (B)	4.95
Zipper (B-C)	4.95
*Miss Tiny (A-B)	3.65
*Spook "48" (A-B)	1.95
Pixie (A)	1.95
American Ace "38" (A)	1.50
CO2 Powerhouse	1.50

Accessories

Wright Test Block	9.50
U-Reely Control	7.50
U-Reely Remote	12.50
*Wood Reel 6" Dia.	.50
*Wood Reel 8" Dia.	.75
*Wood Handle	.75
*2-50' Stranded Wire	2.60
*2-70' Stranded Wire	3.25
*2-30' Lead Outs	.40
Spark Plugs (All Sizes)	.50
Arden Glow Plug	.85
*O&R Glow Plug	.85
*McCoy Hot Point Plug	.85
*Firecracker Coil	2.75
*Smith Competitor Coil	1.95
Aero Quality Coil	3.00
Aero Ft. Wt. Coil	2.50
Racer Condenser	.60
Aero Condenser	.35
Metal Condenser	.30
*Newell Booster Plug	.50
Toggle Switch	.50
Slide Switch	.25
*Hillcrest Timer	1.25
*Austin Timer	1.50
Arden Timer	1.85
Arden Booster Jack	1.25
*Univ. Needle Valve	1.00
*Battery Box (Lg. Med. Small)	.40
*Veco Bell Crank	.25
*Maeco Stunt Tank	1.25
*Maeco Stooge	.35
*Baker Wedge Tank (Lg. Med. Small)	1.25
*Ohlsson "60" Tank	1.75
*Ohlsson "19 & 23" Tank	1.50
*4-Way Plug Wrench	.50
*Austin Glue Gun	.75
*Formed Tail Skid (Lg. Small)	.25
*2½" Solderless Wheels, Pr.	1.00
Ammeter (0-35)	1.85
Voltammeter	3.60

Tools

Dremel Moto Tool	23.50
Dremel Moto Saw	5.85
DeLuxe Vibro Tool	16.50
Hobby Chest No. 86	10.00
Hobby Chest No. 87	15.00
Hobby Hand Drill	1.25
X-Acto Hand Drill	2.75
X-Acto "C" Clamps (4)	1.50
*Ungar Soldering Kit	2.00
*Ungar Woodburning Kit	2.00

Gas Powered Boat Kits

O-Gee (B-C)	5.95
O-Gee Hardware Kit	4.95
Harco Cruiser, 25"	4.95
Chris Craft, 26"	4.95
Owens Flagship, 26"	4.95
"Sea Myth" Luxury Cabin Cruiser, 36"x10"	13.95

Misc. Boat Kits

Southern Belle, 14"	2.50
Dapper Tom, 24"	18.00
Roger B. Taney, 19¼"	11.50
Volante, 21"	15.00
Katy of Norfolk, 20"	8.50
Fishing Sch. Elsie, 21½"	12.50
Young America, 21"	8.50
USS Kearsarge, 32"	8.50
Marion Sprague, 29"	8.50
Constitution, 22"	6.00
Sch. Bluenose, 22"	3.50
Sovereign of Seas, 23"	3.50
Cutty Sark, 24"	3.50
Oil Tanker, 20½"	4.00
Tug Boat, 14½"	3.50
Destroyer Preston, 24"	4.00
Flattie (Sailboat), 16"	2.50
Zephyr (Sailboat), 18"	3.50

Racers

*Thimble Drome "Champ"	3.95
*Thimble Drome Wind-up	2.95
*Thimble Drome w/tether	2.25

Misc. Kits

32 Pd. Carronnade	4.50
Sea Mortar	4.00
One Pounder	4.00
Field Artillery	5.00
*S.F. Cable Car	2.95
*Horseless Carriage	1.50
*Covered Wagon	3.95
*Stage Coach	3.95
*Sportman Convertible	1.00
*AV8 Hot Rod	1.00
*DeLuxe Midget Racer	1.50
*Metal Quonset Hut	1.95
*Gad-Jet Racer	1.00
*Allyn Jet Gun	1.00
*Surrey with Fringe	1.75

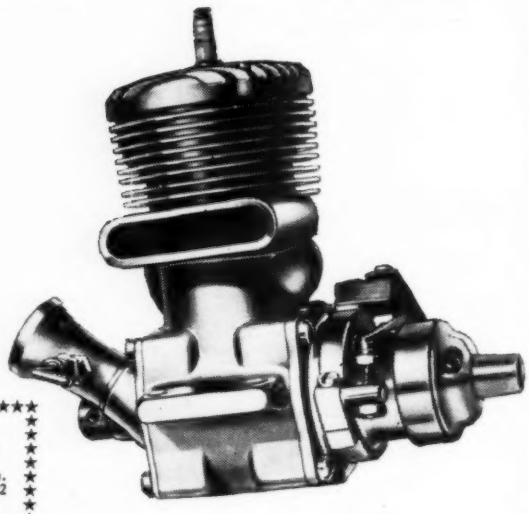
**Means California Merchandise.*

POSTAGE FREE IN U.S.A.
Our policy: Minimum order $1.00. Send remittance in full. $1.00 with C.O.D. orders. (Calif. residents please add 2½% sales tax.)

CRESCENT MODEL SHOP: PLANES, BOATS, TRAINS
5620 West Pico Blvd. Los Angeles 35, Calif.

DOOLING

MODEL "61"—Designed and equipped for high performance installations in racing cars, planes, boats. Finest, most powerful engine for its displacement ever built. Connecting rod w/roller bearing—.607 cu. in. displacement—plate type rotary valve—weight 14 oz. This is the power plant that is helping establish consistent records in the field.



Present records held by DOOLING No. 61 ENGINE

Airplane—AMA Official: Wm. Viets, Springfield, Mass., 143.82 MPH.

Proto Race Car—AMRCA Official: John K. Coppage, Atlanta, Ga., 122.12 MPH.

Spur Gear Car—IMRCA Official: Hap Williams, San Francisco, Calif., 127.11 MPH.

Type "F"—Ball Bearing drive unit—Ball Bearing front wheels —2-piece die-cast mag. body—superb design and craftsmanship.

SEE YOUR DEALER — LITERATURE FREE

DOOLING BROTHERS
5452 WEST ADAMS BOULEVARD
LOS ANGELES 16, CALIFORNIA

½ INCH SCALE FLYING MODEL $1 POSTPAID

World War I SE5-A

DESIGNED ESPECIALLY FOR THE CAMPUS A-100-CO2 ENGINE

Featuring—

RUGGED ALL BALSA CONSTRUCTION
EASY TO FOLLOW INSTRUCTIONS. FULL SIZE PLANS
COMPLETE PRINTED SHEET BALSA PARTS
TEST PROVEN DESIGN FULL COLOR DECALS
A FLYING MODEL WITH THAT SOLID SCALE LOOK

If Your Dealer Can Not Supply, Order Direct *Dealer and Distributor Inquiries Invited*

CARTER CRAFT MODELS
16 MONTICELLO ARCADE NORFOLK 10, VIRGINIA

ANOTHER *FROOM* FIRST!

SPECIFICATIONS
Depth . . . . . 1"
Width . . . . . 1¾"
Length . . . . . 2¾"
Capacity 1¾ fl. oz

Here's real news for all model builders. Our new tank, the FROOM HALF ROUND, incorporates TWO outstanding features.

- **EXTERNAL FILLING** Side-mounted filling tube permits refilling from the outside of the model with standard pump can.
- **LOW-LEVEL MOUNTING** The FROOM HALF ROUND is designed to "lay low"—fitting snugly into the rounded bottom of the fuselage so that control lines may pass over the fuel tank. Simplifies controls. Cuts building time!

PLUS . . .

- Built-in mounting brackets.
- Constant flow of fuel for inverted flying.
- 95% consumption of capacity.
- More fuel in less space.
- Non-corroding tin plate construction.

FROOM MANUFACTURING CO. • 718 E. Colorado Blvd., Glendale 5, Calif.

Wing Tips and Taper

(*Continued from page* 21)

concentration of loads. This condition increases the load on the spar and complicates the design of the ailerons. Several cases of severe wing flutter in the air are believed to have shown that the presence of these concentrations of load at the tip, which are due to the presence of wingtip vortices, may, if the wing structure is flexible, cause serious trouble.

The negatively raked tip seems to give the best pressure distribution. The elliptical tip is almost as good, and present day designers seem to favor it over the others. The elliptical tip makes a better looking wing; it seems to be somewhat easier to construct, and from a consideration of flight tests actually made, seems to result in slightly better performance.

Flight tests made by the government on the upper right wing of a Douglas M-3 biplane with several variations in tip shape indicate:

(a) Shape of the lower wing tip has no appreciable influence over the load distribution over the upper tip.

(b) Simple fairing on the square tip reduces the tip load an appreciable amount; this reduction extends inboard toward the fuselage to about 40% of the chord length, and at the same time there is a forward shift of the center of pressure toward the leading edge for this part of the wing.

REFERENCES

1. *Simple Aerodynamics* by C. C. Carter. Ronald Press, New York, 1940, pp. 121-129.
2. *The Airplane and Its Engine* by Chatfield, Taylor, and Ober. McGraw-Hill, New York, 1940, pp. 31-34.
3. *Elements of Practical Aerodynamics* by Bradley Jones. John Wiley and Sons, New York, 1942, pp. 51-52.

The New Look in Models

(*Continued from page* 28)

model scientists who understand aerodynamics can still expect competition from hobbyists who do not, but who merely have to stick a high powered engine into a light frame in order to win. The interesting feature of the 1948 rules is that wings can be made as large as their strength or your workshop will permit. It now becomes a matter of how large you can build a wing compared to its weight and still have it hold together. This really is an excellent rule because it allows greater scope of design.

The extra 20 oz. per cu. in. piston displ. that the plane must weigh can be more than compensated for by the unlimited wing area allowed. If there are any who doubt this let them look at the chart accompanying this article. It shows the relationship of *power loading* and wing loading, with the flight duration that results from various combinations of these two basic factors in any airplane.

In the vertical column, extreme left, the figures represent oz. per cu. in. piston displ., designated by the symbols W/Cu. In the column immediately to the right, these same values are given in inverse ratio; that is, the figures represent cu. in. piston displ. per 100 oz. airplane weight.

Values of the wing loading factor are shown in the lower horizontal column with the scale at the bottom of the graph. The figures indicate oz. per 100 sq. in. wing area.

In the vertical column, right, duration of flight resulting from various combinations of wing loading and power loading is shown in seconds. This is duration in still air with a 20 second motor run.

Let us see how this chart works. First,

in the left hand column note the value of 100. This line represents minimum weight allowed per cu. in. piston displ. If your plane has an engine of .2 piston displ. the minimum allowable weight is 20 oz.; such a plane is represented by this 100 line because the weight-power ratio is in the same proportion as 100 to 1. So all the airplanes allowed under the rules appear on the chart on or below the 100 line. Any planes that come above the line must weigh less than the 100 oz. per cu. in.

The object of model builders is to obtain as much duration as possible under limits of the rules. One of the specifications of the 1948 rules is that maximum recorded flight time be 10 min. A model that flies more than 10 min. will receive credit for only 10 min.; so your model should be designed for a maximum duration of 10 min. or 600 seconds. The diagonal lines indicate points of constant duration. The upper or first line is the 600 sec. line. All points on it represent airplanes with 600 sec. duration; points above and to the left represent planes with greater duration; below and to the right, planes with less.

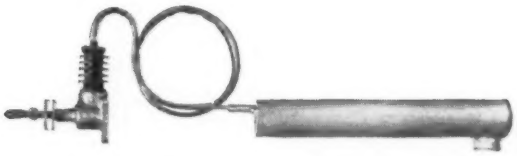
Now note intersection Y of this 600 sec. diagonal line with the 100 horizontal line. Move vertically down from this intersection to the scale at bottom of the chart. Here you see the wing loading required in order to provide 600 sec. duration when power loading is 100 oz. per cu. in. piston displ.; (when weight is 100 times displacement, as 20 oz. for .2 cu. in.).

You will observe in this case that the wing loading must not be over 3 oz. per 100 sq. in. of wing area. For your 20 oz. plane with .2 engine, wing area then must be 667 sq. in. This is the area required to give a 600 sec. duration with lift-drag ratio of 12, because all the figures in the chart are based on a lift-drag ratio of 12 for the whole airplane; that is, airplane L/D=12. This value usually results from planes of box-like structure without extensive streamlining, the sub-average airplane. For fairly well streamlined planes a value of 14 results; and for highly streamlined planes 16 to 18. If lift-drag ratio of this plane is 14, then all duration times indicated by this chart must be multiplied by 7/6: your plane that flies for 600 sec. then will have a duration of 700 sec.

This makes it evident that with an L/D of 14, less area is required to give 600 sec. duration. To find this new area, first multiply 600 by 6/7, which gives 514 sec. Pick out this value on the right hand vertical duration scale; then draw a diagonal line from here to point zero in the lower left corner. Determine the point of intersection of this line with the 100 horizontal line. The vertical line through this intersection indicates maximum allowable wing loading for 600 sec. duration. In this case it is approximately 3.5 oz. per 100 sq. in. If the power loading is greater, for instance 120 oz. per cu. in., then intersection points of the 120 horizontal line and the vertical lines must be considered. If your plane's wing loading is 6 oz. and power loading 120, the intersection falls on the 250 sec. duration line.

However, suppose you built an airplane to last year's specifications and wish to modify it so it will conform to this year's rules. It was powered with a .29 engine and the minimum allowable weight was slightly under 24 oz. On the chart this represents an 80 oz. power loading. The minimum wing loading was 7 oz., if you conformed to the rules. So, on the chart find the intersection point X of the 80 horizontal line with the 7 vertical line;

THE CAMPUS "A-100"



THE WORLD'S SMALLEST AIRCRAFT ENGINE POWERED BY CO2 FOR MINIATURE SCALE MODELS

$12.50

● With the innovation of the jet engine, a complete transition was the resultant in fields of modern aeronautics. So has it been with the advent of the CO2 powered model engine. An entire new field of development is now offered to the model enthusiast. Campus Industries, realizing the potentialities in this line, have designed the world's smallest model engine. Latent possibilities have been made for you in the Campus "A-100." ● Rugged construction, precision workmanship, safety, cleanliness, ease of operation, plus an amazingly low cost per flight are all benefits to you.

BUY ONE TODAY

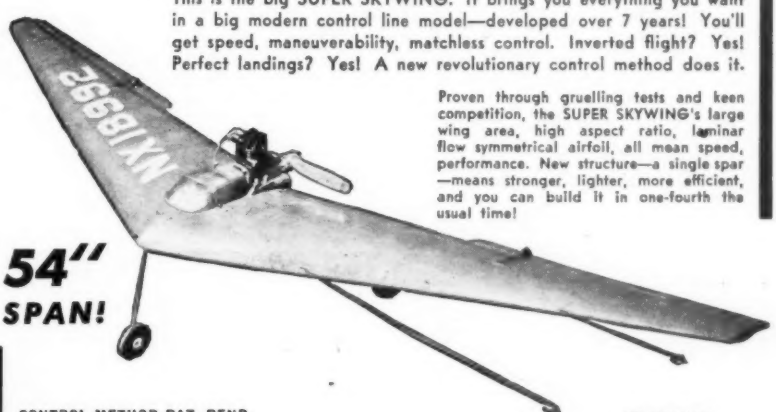
If Your Dealer Can't Supply You Write Direct

CAMPUS INDUSTRIES, Inc.
3914 Ludlow Street Philadelphia 4, Penna.

THIS **AMAZING NEW WING**
OUTPERFORMS, OUTMANEUVERS THEM ALL!

This is the big SUPER SKYWING. It brings you everything you want in a big modern control line model—developed over 7 years! You'll get speed, maneuverability, matchless control. Inverted flight? Yes! Perfect landings? Yes! A new revolutionary control method does it.

Proven through gruelling tests and keen competition, the SUPER SKYWING's large wing area, high aspect ratio, laminar flow symmetrical airfoil, all mean speed, performance. New structure—a single spar —means stronger, lighter, more efficient, and you can build it in one-fourth the usual time!



54" SPAN!

CONTROL METHOD PAT. PEND.

This complete kit, for class "B" or "C" engines brings you all ribs and parts pre-fabricated, grade A balsa, real aircraft plywood, rubber-tired streamlined wheels, easy-to-follow plans. Immediate delivery. Order Kit No. A7 now. Your big SUPER SKYWING will give you EVERYTHING!

ONLY ALL FOR $4.95
POSTPAID TO U. S. POINTS

Designed by a builder of full sized Flying Wings!

ORDER NOW—BE THE FIRST WITH THE LATEST AND BEST!

THE **DON S. MITCHELL CO.** 17105 VIA CIELO SAN LORENZO, CALIF.

America's Finest!

CLEVELAND MODELS rank tops among model-wise builders—because they're really engineered, embody features that give them unexcelled realism, and deliver satisfaction far beyond their low prices.

46" Douglas HAVOC A-20

A real prize model in any collection. One of the famous Cleveland bombers so treasured by real Model builders. MFM Kit. $8.50

43" LUSCOMBE SILVAIRE Gas.... $3.00
30" IT Kit..... 1.00

30" PIPER CUB
Big favorite among all model builders. $1.00
Dry Kit.....

30" Beechcraft BONANZA
Dry Kit..... $1.00

STREAMLINER
B or C. Builds either tractor or pusher..... $4.00

For the Really Serious Model Builders

70¾" Douglas DC-3 MFM Kit $14.50

48⅛" B-26 MARAUDER MFM Kit $9.50

55" B-25 MITCHELL MFM Kit $9.50

30" North American NAVION..... $1.00

32" LANCER
For CO-2 motors
Dry Kit $1.00

Tether TOPPERS

Topper I (CO-2)	$1.00
Topper II (A & B)	2.25
Topper III (B & C)	3.00

32" Baby FLEETSTER
Designed especially for CO-2, but may be flown rubber. $1.25

28" Republic SEA-BEE MFM Kit..... $3.00

30¾" Republic P-47 THUNDERBOLT MFM Kit..... $4.00

LIGHTNING P-38 38¾" MFM Kit..... $4.00
30" T. Kit..... 1.50

Northrup P-61 BLACK WIDOW 49¼" MFM Kit. $14.50
36" T Kit..... 1.50

De Luxe SHARPIE
Greatly improved Kit..... $2.00

Send for FREE Jumbo Folder

See your dealer first. If he is unable to supply you, accept no substitute, but order direct, enclosing 25c for packing and postage.

Cleveland Model & Supply Co.

World's Largest Manufacturers of Quality Model Aircraft Lines—Since 1919

4514E1 Lorain Ave., Cleveland 2, Ohio, U.S.A.

then move diagonally up to the right along a line parallel with the diagonal lines. Such a line intersects the duration scale at the 324 sec. point, which is the maximum duration of your last year's model.

If you are clever enough you will not have to build an entirely new model this year. A new set of wings and tail surfaces with greater area is all that is necessary. Your model must weigh 5 oz. more with this engine—that is 29 oz. instead of 24—because power loading must be 100 instead of 80. So in building your larger wing you have 5 extra oz. for the added structure. This extra weight can be absorbed by increased sizes of wing and tail surfaces. If the increase is over 5 oz. you will be on the safe side of the rules but your duration will be less than the maximum possible under the rules.

Whereas your last year's plane is represented on the chart by point X, this year's plane is indicated by point Y, if full advantage is to be taken of the rules. Your new plane with the .29 engine must weigh 29 oz. and have a wing loading of 3 oz. per 100 sq. in., because point Y is on the 3 oz. line. The wing area then must be $\frac{29 \times 100}{3}$, or 967 sq. in. A stabilizer to go with this wing should have an area at least 30% of 967 or 290 sq. in. The fin area should range between 5% and 8% of the wing area, depending on length of the tail moment arm. If this is short—for instance 2-1/2 times the chord—fin area should be 8% of wing area; if very long, or 4-1/2 times the chord, then 5% of wing area is sufficient. A moment value of 3-1/2 is average, which will require fin area equal to about 6-1/2% or 63 sq. in.

The whole duration story is indicated by the chart and any conditions within the limits of the values on the chart will determine the airplane's characteristics. However, you may wish to build planes beyond these limits. Then you must resort to a duration formula. The following one used in laying out the chart values is quite simple:

$$Du = 0.2 \frac{(r.p.m.)\ Cu\ A}{W^2}$$

Du = duration in seconds; (r.p.m.) = engine revolution per minute; Cu = cu. in. piston displacement; A = sq. in. wing area; W = total airplane weight in ounces. If you wish to find duration with a lift-drag ratio other than 12, use the following formula and insert the new ratio in place of L/D.

$$Du = (0.0167)\ L/D \frac{(r.p.m.)\ Cu\ A}{W^2}$$

These formulas show us that duration increases directly with engine revolutions and displacement, and with wing area. It *decreases* proportionally with the *square* of the weight. The rules peg displacement Cu and weight W, in the relation to one another of 1 to 100. So if power is doubled to obtain more climb—for instance .2 to .4—the weight must double from 20 oz. to 40 oz. This means that the Cu value in the formula doubles to double the duration, while W quadruples to quarter the duration, with the combined result that duration is cut in half instead of improved by an increase in displacement.

The only way power can be increased without increasing weight is by raising the engine rpm: power and duration will increase in direct proportion with it. The chart is plotted for 9000 rpm. If your motor turns faster or slower, compensation must be made in the chart reading for duration. All that is required is to divide the value given by the chart by 9000 and multiply by the rpm of your engine. For instance, if your motor turns at 10,000 rpm, and the chart indicates a duration of 400 sec., the correct duration will be $\frac{400 \times 10}{9}$ = *444* seconds.

Though there is a distinct disadvantage in increasing the Cu value, there is no weight restriction when area A is increased. The formula indicates that duration in still air increases in proportion to wing area. So all we have to do is increase A to the Nth power—provided we can build the structure light enough. Our capacity to build light structures, therefore, is the only limiting factor to endless flight.

In this respect the rule makers are to be complimented, because now every model builder will benefit in proportion to his ingenuity in building strong light structures, as well as to his knowledge of aerodynamics.

The advantage of high power over aerodynamics has not been entirely eliminated from this year's rules, because weight required relative to power has been increased only slightly—from 80 oz. to 100 oz. Some claim that increasing weight relative to power will eliminate only the advantage of cleverness in building light structures. This is not true, because without any wing load restrictions the size of the plane can be expanded to absorb any amount of extra weight imposed and still keep the structure relatively light.

The 1948 rules will certainly encourage a wide scope design and therefore should boost model activity; however they will not prevent models from flying away. Instead they made them more susceptible to thermals by allowing very light wing loadings. Planes can now be made that you can outrun.

A plane with a power loading of 100 oz. per cu. in. piston displ. and a wing large enough to give 600 sec. duration will have a wing load of 3 oz. per 100 sq. in. of wing area, according to the chart. Such a plane will fly approximately 13 mph in level flight. This may be calculated by the following formula which gives approximate level flight speed for the average model.

$$S = 75\sqrt{\frac{W}{A}}$$ S = level speed in mph; W = weight in ounces; A = wing area in sq. in.

Instead of assuming the responsibility for rules that will restrain flight, the rule makers pass the buck to the model builders. They say, "Now you can build gas jobs that will float all over the sky, that will ride the slightest thermal; but—if you lose your plane it is your own fault because the rules say you can only fly ten minutes. All time over this will not be counted as official."

So, all you have to do is tell this to your gas model when you see it going out of sight. Then, if it is a well trained offspring it will return to the field immediately. The combination of this 10 min. rule with lightly loaded floaters makes it anyone's race. Novices can beat experts merely by building a floater; no particular skill is required. Even a piece of old paper can be caught up by the wind and whisked to dizzy heights, so why build planes at all? In plain words the rule makers have again betrayed the model fliers because they have not made rules that put a premium on merit and knowledge.

Loening Amphibian

(*Continued from page 9*)

dope and one colored, while the balsa portions were filled in with clear dope until smooth and then received one coat of colored dope. The wingtip floats are carved from soft balsa, hollowed and attached before the model is painted. Before the upper wing is attached the model should be painted as follows: *Grey*—fuselage, float, lower wing, bottom of upper wing, empennage and struts. *Yellow*—top of upper wing. *Dark green*—bottom of float. *Black*—lettering. U. S. military star insignia appears at each wingtip, and rudder stripes are red, white and blue.

Fortunately the full scale plane used a four bladed propeller because the maximum diameter the model permits is 5 inches, and this would be too small for two blades to develop sufficient thrust. It pays to take pains in making this propeller in view of the fact that it will not be broken because of its location. The original was cut down from two 8" dia. 10" pitch propellers, and the blades should be thinned out in thickness only. The hubs are cut as the sketch indicates, one prop at the forward end and the other prop at the after end. They should be cemented under pressure.

The inside of the cowl should receive 2 coats of shellac and the entire model one thin coat of shellac if *Liquid Dynamite* fuel, is used. It is good practice on a seaplane model to dope as much of its interior as is possible. Dope a small portion at a time as construction progresses.

Flying the *Loening* from land is no different from general practice. Stainless steel lines of .008" dia. were used 35 ft. long, and the model should balance on the forward control wire. The brass sleeves on the float bulkhead should be packed with vaseline or grease to prevent water from entering the float. Do not fly the model from a boat, unless you want to go swimming and crack up the model. A shallow pond 2 ft. deep or less is ideal for water flying. No trouble was encountered in water takeoffs except that the accelleration is less than on land. The advantage of compression or *hothead* ignition will become apparent if the model receives a ducking because there will be no points to clean or wiring to check.

Needless to say, the builder will receive enjoyment from his model in proportion to the care he takes in building and flying.

Scrap Box

(*Continued from page 8*)

only 10 min. was allowed under new rules. Harvey Robbers, Oakland, rang up in the same meet a record of 18:17.0 for Class B hand-launched glider. This one had a projected area of 50.18, projected span 15.47 3-1/2 in. chord at the root. Flat-bottomed wing, 1/4 in. thick. Fuselage was 19-1/2 x 5/8 x 1/4". Tail 3/32-in. sheet. Finish 4 coats of wood filler *with no dope*. Third flight was 12:37.5, but again only 10 min. were allowed. There is one interesting aspect to these rules. It is theoretically possible to set up an unbreakable record, such as 3 flights of 10 min. or more. Unlikely, but it could happen.

Don Foote, designer of the *Westerner*, set a new Class D Open free flight record at Oakland on Feb. 13. His 3 flight total was 13:19.4. Powered by *Dynamite*—literally speaking. Another *Westerner* set a new mark of 15:30.6 in Class C Open, flown by John T. Volponi and powered by *Super Cyke*.

With indoors staging a comeback, the lost art of microfilm covering has got more

SEE YOUR DEALER FIRST — Skyway's Plane Talk — FREE DELIVERY IN U.S.A.
24 HOUR SERVICE GUARANTEED

BASS OR PINE COST TWICE BALSA
BALSA SHEETS—2x18
2 x 36 or 3 x 18 cost 3 times
3 x 36 or 4 x 18 cost 5 times
4 x 36 or 6 x 36 cost 7 times
3 x 60 costs 8 times—4 x 60 10 times
1/64 ....4 for 10c | 5/32 ....3 for 10c
1/32 ....4 for 10c | 3/16 ....2 for 10c
1/20 ....4 for 10c | 1/4 ....2 for 10c
1/16 ....4 for 10c | 5/16 .....6c ea.
3/32 ....3 for 10c | 3/8 .....6c ea.
1/8 ....3 for 10c | 1/2 .....7c ea.

18" BALSA STRIPS
36" costs double. Sizes with * come in 60" too. Cost 5 times 18". Minimum order on 60"—$1.00.
1/16 sq.....20c | 3/16x3/8*....3c
1/16x1/4....15c | 3/16x1/2....3c
1/16x3/16 12c | 3/16x3/4*....2½c
1/16x3/8....10c | 3/16x1* ...3c ea.
1/16x3/8....8c | 1/4x1/4*....4c
1/16x1/2....6c | 1/4x3/4*....3c
3/32 sq....12c | 1/4x1*....2c
3/32x3/16 10c | 1/4x3/4....3c ea.
3/32x1/4.... 6c | 1/4x3/4*....3c ea.
3/32x3/8.... 5c | 5/16 sq....3c
3/32x1/2.... 4c | 5/16 sq.*....2c
1/8x1/4*.... 12c | 3/8x3/8*....3c ea.
1/8x1/16* 10c | 3/8x1/2....3c ea.
1/8x1/4*.... 6c | 3/8x3/4....3c ea.
1/8x3/8*.... 5c | 1/2x1/2*....5c ea.
1/8x1/2*.... 4c | 1/2x1*....5c ea.
1/8x1*.... 2c | 1/2x1*....7c ea.
5/32 sq.*....5c | 5/8x5/8*....7c ea.
3/16 sq.*....5c | 3/4x3/4*....8c ea.
3/16x1/4*....4c | 3/4x1*....9c ea.

18" BALSA PLANKS
36" Costs Double, 60", Four Times
3/4x3/4....10 | 1x6....55 | 2x6...1.00
1x1....10 | 2x2....40 | 3x3....80
1 1/2 sq....15 | 2x3....45 | 3x4...1.25
1x2....20 | 2x4....60 | 3x6...1.65
1x3....25 | 4x4...1.50 | 4x6...2.25

6" x 36" BALSA
1/16"...40c | 3/16"...70c | 1/2"....99c
3/32"...50c | 1/4"....80c | 3/4"....95c
1/8"....60c | 3/8"....90c | 1"....1.00

NOSE BLOCKS
1x2x1 3 for 5c
1x2x2 2 for 5c
1x2x6 5c
1x3x5 4c
1x3x6 7c
2x2x2 3c
2x2x3 5c
2x3x3 7c
2x2x6 10c
2x4x4 15c
2x4x6 25c
3x3x3 10c
3x3x6 15c
3x4x4 27c
3x4x6 45c
4x6x6 60c
PROP BLOCKS
1/4x3/4x5 2c
1/4x3/4x6 2c
1/4x1x8 3c
3/4x1 1/4x10 3c
3/4x1 1/4x12 4c
1x1 1/2x12 7c
1x1 1/2x15 8c
1 1/2 sq.x16 12c
1 1/2x2x18 15c

36" TAPERED TRAIL. EDGES
Save Hours Carving Time
3/32x3/4....5c | 3/16x3/4....8c
1/8x1/2....6c | 5/32x3/4....9c
1/32x5/8....5c | 1/4 or 5/16x1 10c
Also in 5 ft. at triple these prices.

BAG O'BALSA $3 VALUE—$1.00
30 PLANKS & BLOCKS. Approximately 2" thick, 3" to 4" wide, 1" to 12" long. Send Exp. Coll. No pack. chge.

PROPELLERS
Balsa Rubber Power Pitch
6"...4c
6"...5c
7"...6c 6-8-10"
9"...7c 35c 45c
9"...8c 35c 45c
10"...9c 45c 50c
11"...45c 50c
12"...10c 45c 50c
13" x 45c 50c
14"...12c 50c 50c
15"...15c xx xx
16" 90c 90c
18"...1.00 1.00
Flo Torque Webber or Rite Pitch
PLASTIC
2 Blade 3bl 4bl
1½"...2c 10c 10c
2"...2c X 15c
2½"...3c 15c X
3"...5c 15c 20c
3½"...10c 20c X
4"...15c 30c 30c
5"...20c 50c X

CEMENT
CLEAR DOPE THINNER.
1 oz. 7c, 2 oz. 10c
½ pt. 40c, pt. 85c
Gal. Exp. Col. 2.25
COLORED DOPE
10 Asst. Colors
MICROFILM.
WOOD FILLER or LIQ. CELLULOID
1 oz. 9c, 2 oz. 15c
½ pt. 50c, pt. 75c
Gal. Exp. col. 4.95
RUBBER LUBE
2 oz. 20c
PLASTICO ROC 25c
3 oz. 8 asstd. cols.
PLASTIC WOOD
¾ oz. tube 10c
MOLD-EX
Mold Plastic Parts
½ pt 55c; pt $1.00

SILKSPAN, white, 3 sheets for 25c
Rubber Power 5c
A. A. TISSUE
10 Assorted Colors, doz.....35c

PRE-WAR SILK TRIPLE A grade 4mm $1.98 sq.yd.
SPRAY GUN..98c
Heavyweight De Luxe, 2 jars $1.98

RUBBER WHEELS
1½"....3c pr.
2"....5c pr.
2½"....7c pr.
PLASTIC WHEELS (Lightwt) per pr.:
½ 2c; ⅞ 4c;
1¼" 5c; 1¼" 7c

KIT MANUFACTURERS
Skyway's new, streamlined price and service set-up gives you special cut balsa, metal parts, access., etc. Send requirements and we will quote.

SKYWAY BARGAINS
42"—¾ Scale FLYERS, Cadet Thunderbolt—Hellcat, Mustang. Were $1. NOW ALL 3—$1.95.

MASTER MODELCRAFT $3-4 Solids
Mustang, Martin B-26, Corsair, Douglas, Mosquito, Thunderbolt. Can be converted into Control Liners.
ONLY $1.95 each

6 CADET 25c SOLIDS only 98c
Thunderbolt, Hellcat, Focke-Wulf, Typhoon, Spitfire, Mustang

RAY $1 SOLIDS 59c each
Hellcat, War Hawk, Mustang, Spitfire, Typhoon, Shooting Star

$1 RAY ROCKET ONLY 59c
$1.25 RAY ROCKET GUN Only 59c

Varney-Sub $2.50
Was $5.00
All parts moulded of precision plastic.

Varney PT BOAT
Over 130 die cut parts of wood, metal and plastic.
Was $7.95. $5.00

VARNEY L.S.T. Was $10.95 Now $5.00

Roger Weasel
Formerly $2.95 — NOW $1.00

Rogers LCI
Formerly $2.95 NOW $1.00

COMET B-29
3/16" scale, 26½" span. Was $2.50. Now $1.95
6-10" $1 Super Solids. Mustang, Mosquito, Thunderbolt, Corsair, Hellcat, Douglass. $2.95, or 60c ea.

WE STOCK ALL WORTH WHILE ADVERTISED KITS and SUPPLIES

GAS ENGINES •With Coil & C'denser
Atom A .099.....15.50
•Arden .099 $12.50. B.B.....15.50
Bantam A .199.....18.50
Arden .199 BB.....18.50
Madewell C .....was $18. now.....12.50
Contestor C, Rotary Valve.....18.50
•McCoy—
29—19.50. 49—25.00. 60 27.50
Hornet C 28.50. Ohlsson .19 9.95
Ohlsson "23" 9.95; "60" C.. 11.95
Ohlsson Glow-Plug Kit 19-23.. 8.95
Super Cyclone C, Single Ign... 18.95
Super Cyclone C, Dual Ign.... 19.95
Drone Diesel, 14.95; OK Cox.. 4.95
Rogers 29. was $15.75. now.. 6.95

SUPER PLANS $1.00 Packets
Scale Three Views ¼" = 1'
PACKET NO. 1
Typhoon
Vought Corsair
Spitfire IX
Focke-Wulf 190
Vought Vindicator P3B
P-40F
Mosquito
PACKET NO. 2
Hellcat
Zero
Stormovik
Thunderbolt
Mustang P51
Airacobra
Avenger
PACKET NO. 3
Hawker
Airacomet
Black Widow
Hurricane
Kingcobra
Saab 18
Douglas A20
Dauntless
PACKET NO. 4
French Spad
Fokker DV11
Sopwith Camel
Nieuport 17C1
Fokker DV111
British SE5a
Albatross
PACKET NO. 5
Flying Fort
Marauder
Mitchell B25
Liberator
Lancaster
PACKET NO. 6
Culver-V
Seabee
Piper Super
Aeronca
Voyager
Globe Swift
Ercoupe
CONTROL LINE 1" "B" or C
PACKET NO. 10
Typhoon
Vought Corsair
Spitfire IX
Focke-Wulf 190
Mustang P51
PACKET NO. 11
Hellcat P6F
Airacobra
Curtiss P40
Zero
Thunderbolt
PACKET NO. 12
Hawker Tempest
P38 Lightning
Kingcobra
Dauntless SBD5
PACKET NO. 13
Spad Fighter
Fokker DV11
Sopwith Camel
Nieuport 17C1
Fokker DV111
PACKET NO. 14
Piper Skycycle
Globe Swift
Ercoupe
Johnson Rocket
Culver Model V
PACKET NO. 15
Gee Bee Racer
Fokker Racer
Wendell Williams
Roscoe Turner
Howard Ike
Pulitzer
FOLIO NO. 1
Knight Twister
Cloudster Twister
Helldiver
Hep Cat
Chief Sankee
FOLIO NO. 2
Hail Racer
Hill Special
FOLIO NO. 3
Stahl's Corsair
Bob Cat
Flying Lab
Copperhead
Coupe Del Aire
"A" or "B"
Gee 38
Culver Cadet
Funk Special
"A" or "B"
Culver Dart
Playboy
Live Wire
Live Wire Jr.
Live Wire Sr.
Live Wire Trainer
Live Wire Clipped Wing
Live Wire Sr. Clipped Wing
Live Wire Trainer Clipped Wing
Live Wire Jr.

TROPHIES MEDALS AWARDS

By SPARKY

SPARKY features AIRPLANE figures! Always in stock, can ship at once! Engraving is available. DEALERS—CLUBS—CONTEST DIRECTORS—Write for our catalog on your letterhead.

P.S. We have T-Shirts, too!

SPARKY says: ask for...

SPARKY-BILT

FILIT – FIL

The only fillet material that GUARANTEES the following:

Adheres to all woods, metal, glass, leather and plastic.

Easily applied, dries hard in a few minutes and requires little or no sanding.

Can be thinned with Acetone or dope thinner for an ideal wood surfacer and sealer, sands easily.

WILL NOT CRACK, PEEL, CHIP OR SAG

a must before you finish THAT model

2 oz. JAR 35¢

SPARKY SPECIALTIES, INC.
173 West Madison Street Chicago 2, Illinois

than one brawny gas modeler on the ropes. A stopover at Walt Schroder's found Walt hanging over the edge of the bathtub, hoop in hand, muttering strange imprecations. Seems that no one has presented adequate dope on how-to-do. Walt would lift the hoop and the excess film would instantly whip up under the hoop for a nice piece of double—but useless—covering material. Then he figured that the edges should be tucked in. That worked okay, but when he tried (four times) to cover the wing, the dihedral got in the way. *Now* he knows (we-uns, too) that you cover an indoor wing flat and put in the dihedral later. At this stage of the game, gas-modeler Schroder discovered that when you glue a joint on an indoor model you exhale a cement-scented breath, otherwise the "mic" vanishes into thin air. Finally came the supreme moment. Off went the ROG putt-putting past baby's crib. Young Schroder made an expert grab.

Bathtubs seem to be the theme of this month's scrap box. From Schroder's we drove over to Tyler's, and there was another big man making passes over the tub. Daughter Bonnie was standing by saying "Pretty, daddy, pretty." And when we got home there was still more about tubs in the mail.

Hank Cole was arguing that taking model pictures requires more than a good camera and a few minutes, and that it takes time to set up lights, the background, and get the right focus. "Take Chuck (Hollinger) for instance," said Cole. "He has been working for 2 weeks on the photos of his new scale model, an *Aeronca C-3*. Just to show you what can happen; he was using the bathtub for a fixing bath while developing his films. In the midst of things his 2 year old daughter Cheryl fell into the bath and stepped all over the negatives. However, Cheryl fared worse than the negatives, as the chemicals bleached her hair and changed her complexion temporarily. So you can see it is not always easy to take pictures."

Too bad we can't enter that one in our tall-but-true story competition, Hank, as announced last month. It would have copped the free subscription. But alas and alack, as this is being written our last column has not hit the stands, so we'll all have to mark time until next month for some of those yarns. Russ Nichols at the AMA mentions a fellow at Hybla Valley (near Washington) who had a ship up for a terrific flight when the timer went to lunch. Reminds us of the fellow at the Nationals who stayed up all night to finish a crate, then took a moment's rest at 7:30 a.m. and woke up late in the afternoon. Or the chap who also stayed up all night to make an indoor model, then took a shower and jumped into bed on top of the model! (Guess we'll award ourselves the subscription this month.)

J. C. "Madman" Yates took seriously our suggestion to glue the stories to the tops of kits, which should be sent to the name at the top of the column. Late in February the postman staggered to our door with one of the first "Madman" kits. And what a kit it is! Hope you sell a million, Madman, or is it Madmen, Madman? It's getting so, really, that you can plunk your finger down blindfolded in the ad section and hit a hot stunt ship.

To you Britishers who wrote to straighten us out on that non-existent control line event at your 1947 Nationals, thanks for the info. Douglas Gordon, Secretary of the *West Essex Aeromodellers*, whose letter was the first to reach us, writes we must have been thinking of a rally at Radlett in Hertfordshire, organized by the *St. Albans Model Flying Club*, at which there was a U-control event, one entry being a *Dynajet*. There was no control-line event at the last English nationals, "an omission which most certainly will be rectified this year," according to Gordon. Speaking of the possibility of a Wakefield team coming over, Gordon says: "Maybe we shall also have room to pack a few gas models which, from the impression you seem to have, should give you a surprise." Well, as a matter of

(*Turn to page 44*)

IMMEDIATE DELIVERY

On any item advertised in Model Airplane News

Send in name and address to be informed of all new items and price changes.

FISCHER'S HOBBY SERVICE
618 S. 4th St.
LOUISVILLE KENTUCKY

PITTSBURGH'S WHOLESALE DISTRIBUTOR...

✓All leading lines
- MODEL AIRPLANES
- MODEL BOATS
- MODEL SUPPLIES
- FULL LINE OF MOTORS

Dealer's Price List Available Upon Request
WHOLESALE ONLY

J. SPOKANE & CO., Inc.
1106 Fifth Avenue, Pittsburgh 19, Penna.

1948 NATIONALS!
Olathe, Kans. . . Aug. 3-7!
(Read Details on page 30)

BIG Assortment GUNS & BOMBS 25c
Postage 5c Extra

Special big assortment of 10 die-cast finely detailed BOMBS and GUNS

BLOCKBUSTER 8c
Postage 3c

PROPELLERS STANDARD TYPE Die Cast White Metal

ALUMINUM Adjustable Pitch

7½"	.25
8"	.30
10"	.35

ALUMINUM Tubing .010 Wall per foot

1/16"	.12
3/32"	.12
1/8"	.12

2 Bladed

1½" No. 13	.05
2" No. 14	.07
2½" No. 15	.08
3¼" No. 16	.10
4" No. 17	.12
4½" No. 18	.15

3 Bladed

1½" No. 25	.08
2" No. 26	.15
2½" No. 27	.15
4" No. 28	.20
4½" No. 29	.25
5" No. 30	.30

Spinner Type

3¼" No. 1	.18
4" No. 2	.20
4½" No. 3	.22
5" No. 4	.25
5½" No. 5	.30
6" No. 6	.35
4" No. 7	.25
4½" No. 8	.30
5" No. 9	.35
5⅞" No. 10	.35

ADD 3c EACH FOR MAILING

Boat and airplane fittings—parts also largest complete line of O-HO-OO gauge Railroad parts available anywhere.

Send for your catalog and assortment today! Catalog only 5c to cover mailing.

SELLEY MFG. CO., Dept. 305, 1377 GATES AVE., BROOKLYN 21, N. Y.

ALL SIZES
ALL PITCHES

35¢ Now LACQUERED and BALANCED PROPELLERS

For quality, you can't buy a finer propeller than the POWER PROP for consistent speed and power, or the TOP FLITE for stunting and sport flying at any price! Yet they come to you at a really low price—35c! Why? Because these props are precision machined on specially built propeller carvers to close tolerances. That reduces possibility of error, cuts down hand-sanding for us, means lower cost to you! That makes sense, and is why these finely lacquered and balanced propellers are standardized at ONE LOW PRICE 35c—for all diameters and pitches. Now you really get the benefit of our precision methods in both price and quality!

Power Props

Dia.	PITCH
7	*6 **8—9—10½
8	**6 —8—9—10½
9	6 —8—9—10½—12
10	6 —8—9—10½—12
11	6 —8—9—10½—12

*Special CO_2 prop.
**Drilled for Arden .099.

and here's

THE "TOP SECRET" IN PROPS!

The Boys on the Coast worked this out . . . here's the dope! Everybody remembers how the Californians swept the '47 Nationals and the East-West Challenge Meet. Questions buzzed all over the country . . . was it superior design . . . fuel . . . engines . . . or props? Yes, prop **pitch** had a lot to do with it, and the champs will admit it! They found **10½"** pitch . . . that's it, 10½" pitch . . . to be best for speed from .29 engines right up through the 60's! Now American Hobby POWER PROPS bring you this important pitch at a remarkably low price, only 35c. Get a few from your POWER PROP dealer and see for yourself what a difference it will make!

And what about stunt? Props make a real difference there, too, as any expert stunt flyer knows. TOP FLITE propellers were on many of 1947's top flying ships. For example, Bob Tucker, the brilliant open stunt champ, used TOP FLITES to win not only the Nationals but many other meets as well!

POWER PROPS and TOP FLITES are "Precision Finished." "Precision Finished" Props Mean Better Performance! Buy 'em . . . Try 'em . . . You'll Fly 'em Forevermore!

Yes.

TEAM WORK PAYS!

My associates and I at American Hobby work together as a team to give you the best in props and kits at low prices. Our motto is "First make it right; then make it better; and then find ways to produce it at lowest cost!" It's team work that makes American Hobby props and kits outstanding!

Top Flites

Dia.	PITCH
8	*3½ **6—8—10
9	3½ —6—8—10—12
10	3½ —6—8—10—12
11	4 —6—8—10—12
12	5 —8
13	5½
14	6

*Special CO_2 prop.
**Drilled for Arden .099.

American Hobby SPECIALTIES, INC.
2900 S. MICHIGAN AVENUE CHICAGO 16, ILL.

See the NEW PHANTOM... at your HOBBY SHOP

1. Chrome plated inner cylinder wall . . . longer wearing.
4. Cast iron piston . . . compression at all temperatures.
2. Leakproof, integral exhaust stacks . . . cleaner motor.
5. Machined dural Timer Body . . . positive point action.
3. Precision ground needle valve . . . easier starting.

13.95 (LESS C & C)
14.95 (WITH C & C)
BOTH PRICES INCLUDE GAS TANK & SPINNER

Now you can see how **Phantom** engineers have designed and built **Phantom** so that it is one of the "hottest" Class B engines on the market today. Visit your local hobby dealer, and ask him to show you **Phantom** and tell you about its 5 outstanding features.

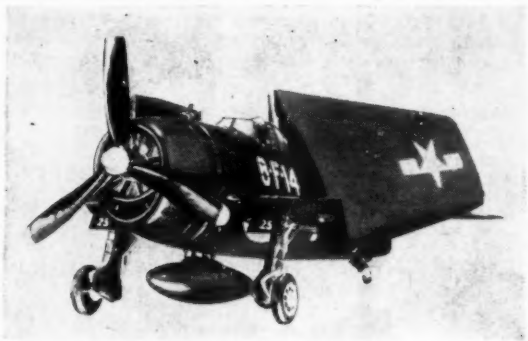
Ask your dealer for the latest illustrated literature.

SPECIFICATIONS

Displacement .295 cu. in.
Stroke . . . . . .750 in.
Bore . . . . . .711 in.
Horsepower . . 1/5
Rated Class "B" Under N. A. A. Rules

ATTENTION DEALERS:
An important announcement is coming soon! Are you on *Phantom's* mailing list?

PHANTOM MOTORS DISTRIBUTING CO.
806 E. Gage Avenue, Los Angeles, 1, California



F6F
U. S. Navy Fighter
$2.75

DYNA-MODEL DOES IT AGAIN !

No one—yes, No one else except Dyna-Model makes such accurately detailed 1/4" scale solid model kits—even to folding wings—such as the pictured Grumman "Hellcat" with its carved fuslage and 23 authentic superbly finished parts, including propeller, engine and duct, cockpit details, landing gear, bubble canopy and armament—$2.75.

Other exciting "Dyna-Mo" kits which give the model builder the chance to give his model that professional touch are:

P51 "MUSTANG"—23 FINISHED PARTS, CARVED FUSELAGE $2.75
P38 "LIGHTNING"—48 FINISHED PARTS, CARVED FUSELAGE 3.50
F8F "BEARCAT"—15 FINISHED PARTS, FOLDING WINGS 2.75
P47 "THUNDERBOLT"—43 FINISHED PARTS, PLASTIC WING TIP LIGHTS 2.95

All kits have templates, jigs, decals and engineered drawings.

Ask your dealer for "Dyna-Mo." If he cannot supply you write us direct enclosing check or money order plus 25c for packing and postage—no C.O.D.'s.

Model R.R. fans—see our ad in Model Railroader for outstanding "HO-OO-O" accessories.

DYNA-MODEL PRODUCTS COMPANY
76 SOUTH STREET, OYSTER BAY, NEW YORK

"Rite-Pitch" THE N-E-W-E-S-T NEW 1948 MODEL WORLD'S FINEST GAS MODEL PROPELLERS!

CONSTANTLY IMPROVING TO MEET ALL CONDITIONS!

THIN, FAST AIRFOIL SECTION!
Thinner hubs so that even 12" pitch propellers will fit standard motors without carving down.

SUPER STREAMLINING from hub into blade section to reduce Propeller drag to an absolute minimum. Finer, "Silky-Smooth," High gloss lacquer finish!

MORE MODELS ARE FLOWN WITH "RITE-PITCH" THAN WITH ALL OTHER MAKES COMBINED!!

8"-9"-10"-11" ..... 50c LIST
12"-13"-14" ..... 60c LIST
ALL DIAMETERS ARE MADE IN 6"-8"-10"-12" PITCH FOR STUNT—SPEED—CONTROLINE OR FREE FLIGHT.

BUY "RITE-PITCH" ACCESSORIES
For Better Flying At Lower Cost!

JOBBERS: Contact us today!

GET THE FREE "RITE-PITCH"
"Compedium of Information on Gas Model Propellers." At Your Dealers or Write Us.

DEALERS: All Jobbers who have your interests at heart and want you to make money can fill your order.

Bob Roberts RITE-PITCH 110 W. 7th Ave., Gary, Ind.

GENUINE SELECT **BASSWOOD** *Sheets*

THE IDEAL WOOD FOR MODEL BUILDERS

(1/8" x 3 1/4" x 18")

All Uniform Sheets • Dried and Cured 6 Years • Highly Milled and Sanded

WORKS EASILY • LIGHTWEIGHT • RUGGED

$1 per dozen sheets
6 dozen sheets $5
CASH, CHECK, MONEY ORDER
Free Postage in U. S. A.

Dealer's Inquiries Invited

WHITTLER'S CRAFT
Dept. X
BOX 981, PROVIDENCE, R. I.

fact, why not develop some powered equivalent of the Wakefield contest.

Bill Dean, also writing from England, sends a little background on their control flying. This first filtered through about three years ago but nothing much was done about it. (Reminds us of Jim Walker's crusading to get us to try U-control.) "In 1946," says Dean, one or two modelers actually did some straightforward flying with *Ohlsson 60* and similar powered jobs. One of the first in the London area was Ron Moulton who brought back the idea from South Africa. I had never seen one before and neither had many of the others. We thought it was wonderful. And this was late in 1946." Control flying really took hold last year in England. In Dec. 1947, Ted Buxton was the first to do consecutive loops. Several *Dynajets* are flying and Freddie Guest has done 138 mph with one, which is traveling in any jet league (Bill Tenney, another set of valves, please!). Oddly enough, no prop job had broken 100 at the time Dean wrote us. Do you recall how long we stalled at about 100 mph? (Which reminds us, coast jobs are hitting 150 plus!

It is hard to realize how tough things are for the British modeler. Lack of engines, and other handicaps, have him in the same desperate jam we were in during the war. Despite such handicaps he is making fast progress in these newer wrinkles. From what we saw at our own Nationals, and of British sailplane designs in their mags, we suspect that with the exception of the Zaic's who have developed an excellent line of soarers for the market, the British lads may have us shaded in this field of design. They are good, too, no doubt in Wakefield, but on-the-spot experts think it will take up to two years to establish national trends in powered models.

One type of model that has found great popularity in Great Britain but which is virtually unknown in this country is the round-the-pylon or RTP model flown indoors during the winter season. First introduced in 1937 or thereabouts by R. N. Bullock, these novel ships have now achieved a duration of about 6 min. Rules permit two classes: Class A for models up to 1 oz. in weight, and Class B jobs for weights over an ounce. For the smaller class, a 3 ft. high pylon and a 6 ft. line is specified; and for Class B ships a 6 ft. pylon and 12 ft. line. British experience has been that prop and power combination is paramount, followed by air-leakproof covering, light weight, and streamlining in that order. Props run to half the span with a pitch-diameter ratio of 2 to 1.

Bob Copland, of Wakefield fame, writing in the *Aeromodeler* (from whence comes this dope) emphasizes the importance of a prop that will "fan out" like an indoor prop to seek increased blade angles with the excess power at the beginning of the run. He makes the suggestion that a slot be cut halfway out on the blade in the leading edge, this slot being about half the blade chord. This will permit flexing of the outer portion of the blade with the hub portion remaining adequately strong. An odd feature of these interesting airplanes is the combination of tissue on fuselage and the microfilm wing and tail, and the fact that the mic is heavy in the interests of smooth covering rather than extreme lightness. Tissue leaks air unless structure-distorting doping is resorted to. Copland thinks superlight construction is n.g. and that the frame should not have a tendency to sag.

A plan of Copland's *Thistledown*, a 21-1/2 in. job that has done 5:36 min. RTP, reveals some interesting construction features. It has a boxlike fuselage with 3/64" square longerons ,and elliptical wing and tail, selected for torsional rigidity. Both wing and tail edgings are made from laminations of 2 strips. The wing utilizes 2 pieces of 3/64" x 3/32", and the stab 2 laminations of 1/32" x 1/16". Wing section is the usual single surface indoor airfoil. Power is 6 strands 1/32" square rubber wound to 2,000 turns maximum. Total weight is .338 oz. American builders will be quick to jump on those durations. But the more you think about it the more you are apt to wonder. Considering those rules on pylons and lines, what duration can *you* get?

Miniature Pulse Jets

(*Continued from page 15*)

Dyna-Jet engine at an A.M.A. sponsored meet at Burlington, N.C., last October 28.

Let's assume that you have just purchased a jet engine. "Breaking in" is not necessary since the valves are the only moving parts. Ground running is not only unnecessary but also inadvisable. Since there is no cooling blast of air as with a prop driven plane, the combustion chamber will glow red hot shortly after starting; in motion, the engine is properly cooled by the air-flow.

Before describing the starting technique, it is important that a few safety rules be discussed and constantly kept in mind by the modeler. We repeat that the engine is not a toy and must be handled with good judgment and adult care. Since the static operating temperature may go as high as 1700°F, do not allow anyone to touch the tube while in the process of starting, or for a few minutes after the engine has stopped and is cooling off. Never look down the exhaust tube to check the spark while the ignition or air supply is on. If the engine is flooded the spark may cause it to backfire, with or without compressed air. Run the engine in a clear space free of any inflammable material. A pulse jet cannot explode if gasoline alone is used as a fuel since it cannot contain more than its cubic capacity of air at any given moment.

In flying a jet plane it is important to get the model moving and into the air as soon as possible after starting the engine. This may be accomplished with relative ease by employing the teamwork of several men as will be explained. It is possible, if the setup is correct, to start the jet in a few seconds with a minimum of effort. The following equipment will be necessary: A vibrator coil and batteries; a toggle or slide switch; hookup wire; high tension wire; 2 alligator clips; compressed air tank and fittings (or heavy duty tire pump).

For a steady hot spark, a Ford model T vibrator coil supplied with 6 volts from dry cells, radio A batteries or a small storage battery will serve the purpose nicely.

Experiments have shown that an air pressure of between 35-100 psi is necessary for starting the jet when cold. While it is possible and relatively easy to start the engine with an ordinary tire pump, for quicker and simpler starting we recommend a small pressure tank that may be filled by any gas station air pump, air compressor or even by a hand pump. A surplus Army Air Forces oxygen tank fitted with valves and air hose will serve as an excellent compressed air reservoir.

For best results, the engine should be run on plain non-leaded gasoline. White gas or *Sunoco Dyna-fuel* fall into this class. Since the only moving part is the flutter valve, no oil is necessary. Fuel consumption is approximately 3 times that of the larger C class engines, hence your tank will require a capacity of 4 to 7 oz.

The gas tank design follows conventional lines. Approximate dimensions for a rectangular tank might be 2 x 2-1/2 x 3 in. Solder 3 lengths of 3/32" i.d. copper or brass tubing to the tank as filler lines. The use of 2 filler lines is recommended, one for a pressure equilizer, so that it won't be necessary to remove the gas line when filling the tank. End these lines 3/8" above the top of the tank and curve them in the direction of flight to utilize the effect of rammed air. The outlet tube

DURO-MATIC **Invader**

ALL-METAL PLANE KIT

Designed by Ed Sharpe

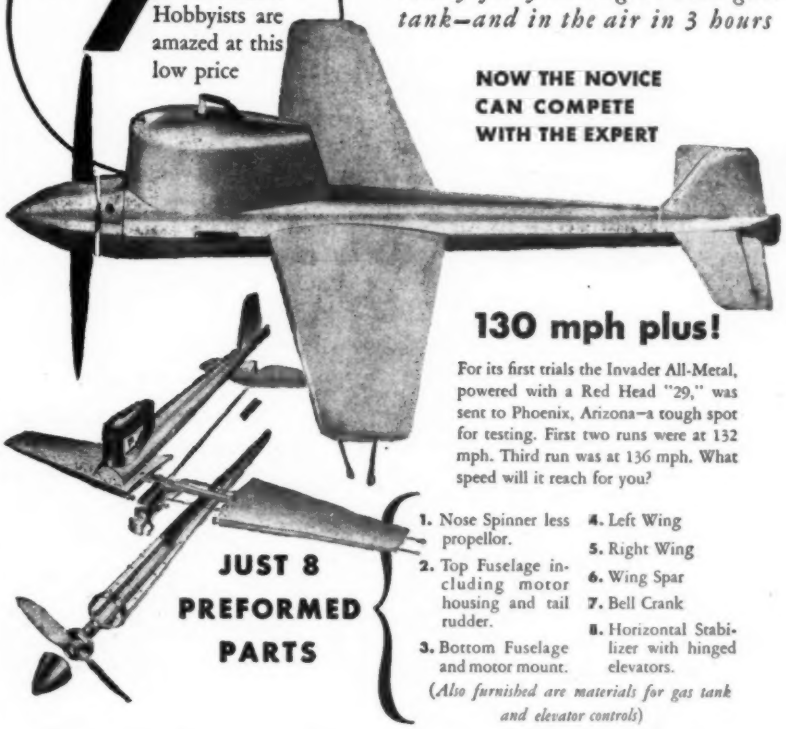
ONLY **$7.95** Class B

Hobbyists are amazed at this low price

Put it together in 10 minutes with 10 screws

Ready for your engine and gas tank—and in the air in 3 hours

NOW THE NOVICE CAN COMPETE WITH THE EXPERT



130 mph plus!

For its first trials the Invader All-Metal, powered with a Red Head "29," was sent to Phoenix, Arizona—a tough spot for testing. First two runs were at 132 mph. Third run was at 136 mph. What speed will it reach for you?

JUST 8 PREFORMED PARTS

1. Nose Spinner less propellor.
2. Top Fuselage including motor housing and tail rudder.
3. Bottom Fuselage and motor mount.
4. Left Wing
5. Right Wing
6. Wing Spar
7. Bell Crank
8. Horizontal Stabilizer with hinged elevators.

(*Also furnished are materials for gas tank and elevator controls*)

Completely Revolutionizes Speed Flying

This Invader All-Metal job is something to talk about. Think what it means! Tedious bench-time cut from 40 hours or more to almost nothing. Imagine having a plane *in the air* only 2 or 3 hours after you start to work on it! Now both beginner and expert can enjoy lots more time *flying* his plane. All parts fit like a glove…no riveting, no trimming, no soldering—just 10 screws and it is together. Wings are precision formed and spot welded. Horizontal stabilizer and elevators are hinged here at the factory.

There are no paint problems with the Invader. No parts can fall off in flight. Motor mount is fool proof and will accommodate the Red Head "29," Sportsman Jr., or any standard Class B engine. Sturdiest plane ever flown, taking in stride rough landings which often crack up other types of ships. Made of light-weight aluminum. Replacement parts available. Manual giving West Coast speed secrets included with each kit.

The Invader All-Metal conforms to present AMA rules and is official AMA record holder in its class. See the Invader at your Hobby Dealer. (If no dealer near you, or if your dealer does not have, order direct from factory.) Class A, C and D Kits (AMA) available soon.

Send for free "Checkered Flag" Decals — write Dept. TA

DURO-MATIC PRODUCTS COMPANY

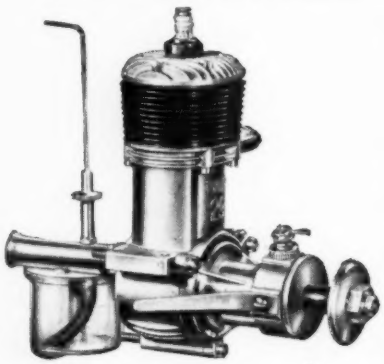
HOLLYWOOD 38, CALIFORNIA

NOW MORE THAN EVER

A BARGAIN IN QUALITY

FORSTER "29"

HIGH PERFORMANCE ★ **NEW LOW PRICE!**



THE SAME BALL BEARING ENGINE!
THE SAME HIGH QUALITY!
THE SAME SPEED AND POWER!
Everything is the same except the
NEW LOW PRICE!

Here you get a quality "double-duty" engine complete with metal fuel tank and timer for spark ignition operation, which, however, operates equally well with the new glow-plug. Nothing but a change of plugs is necessary to give you top performance in both fields.

Write us for literature showing comparative power curves of actual power developed with spark plug and glow-plug ignition, using gasoline, alcohol and glow-plug fuel.

See it at your dealer's!

ONLY $14.85 LESS C.&C.

FORSTER BROTHERS
3539 N. Kenton Ave., Chicago 41, Ill.

SPEED + SPORT = RED HEAD

THE FAMOUS MINIATURE JET GASOLINE ENGINE

DYNA-JET

THE **ULTIMATE** IN ENGINES!

PAT. PENDING

RACING ENGINE

SPEED!

4¼ lb. Static Thrust Equal to 2 Hp. plus
Exerted at 125 mph with 70% "Prop" efficiency!

BOX SCORE

Airplane Models:
134.50 mph.
AMA official speed by Harold Bunting at Roanoke, Va., Oct. 29.

Racing Cars:
128.75 mph.
official AMRCA record at Bakersfield, Cal., Sept. 27, by Ray Vivian.

Ice Sleds:
129.0 mph.
by John Kates at Pontiac, Mich., Jan. 26.

SPORT!

Easiest Starting
ask the man who owns one!

No Ignition System
to burden your model!

No Propellers to Break!

No Special Fuels
runs on straight gasoline!

Not Sensitive to Weather
you can forget about humidity and temperature!

The BEST ENGINE and the LEAST EXPENSIVE
It Will Not Wear Out!

Runs as well 5 years from now as it does today. You save on engine life, trade-in value, and propellers. Your most economical buy.

$35.00 If dealer can't supply, order direct. Prompt Delivery.

MAX. DIAM. ....2½"
LENGTH .....21½"
WEIGHT .....16 oz.
FUEL .....Gasoline

GUARANTEED

1. To start easily with hand tire pump.
2. To equal or exceed advertised power.
3. Against defects in material and workmanship.

Dyna-Jet SPEEDSTER
Flight tested, control line model. Complete plans FREE with each engine. Plans only — 30c in stamps.

AEROMARINE COMPANY
Dayton Municipal Airport
Vandalia, Ohio

should be made of several inches of 3/16 in. dia. copper tubing extended to the bottom and outside of the tank so as to compensate for the effect of centrifugal force when in flight. Outside refers to that side of the tank which faces away from the center of the flying circle. Curve the tubing parallel to the carburetor axis in the direction of flight, and connect both with a piece of neoprene hose of sufficient wall thickness so as to resist crimping when subjected to airstream velocities of 100 mph or more—3/16 or 1/4" o.d. neoprene is about the right size. Wrap both fuel connections with soft wire to prevent air leakage into the lines.

The top of the tank should not be higher than 5/8" below the centerline of the carburetor tube or more than 1-1/2" below this. For best results, it is recommended that the tank top be 5/8" to 3/4" below the centerline of the carburetor.

Place the rear end of the tank at least ¾" in front of the combustion chamber and directly below the cowl. Make sure it is leakproof and that there are no sharp bends in the tubing. These checks, though seemingly minor in detail, cover points that have all popped up at some time or other in the author's experiences and were cause for running failure.

Jet starting operation should be preceded by a few preflight checks which will be discussed in more detail later on. Check for spark in the plug by unscrewing the valve head and throwing the switch. A rich continuous spark should jump the gap of the plug. If the batteries are weak or the hook-up incorrect, the spark may be too weak, discontinuous or non-existent. A quicker check, which may suffice, is to hold the plug high tension line slightly away from the body of the jet and throw the switch. A continuous spark jumping at least 1/8" or 3/16" air gap is sufficient.

Keep hands off the jet or any parts grounded to it while the switch is on, unless you're in the market for a harmless but surprising shock. And remember to throw the switch off before trying to remove the airhose when the engine has started.

Before starting, keep the following safety factors in mind, some of which are repeated. Keep all inflammables at a safe distance. Wipe off any gas which may have spilled on the model in filling the tank. Prevent spectators from crowding in behind the model. Keep objects as well as people away from the exhaust tube. Have a fire extinguisher handy for obvious reasons—remember, she runs hot! Don't touch any part of the engine during or immediately after running.

Choose as a flying sight an area in which at least 1/3 of the circle is smooth dirt, cement or tarred surface. Some difficulty may be experienced in attempts to take off rough grassy ground. Due to the absence of inertia forces (as present in a reciprocating engine) the fuel system is critical. A bumpy takeoff may result in fuel cutoff and engine stoppage. In the conventional model engine, if fuel is cut out momentarily by an air bubble in the line, the engine may not stop due to inertia of the moving parts which continues to turn over the propeller. However, in the case of this type of jet engine, since each cycle depends mainly on the pressure drop of the preceding cycle, immediate stoppage will result if fuel flow is interrupted for a fraction of a second by an air bubble in the line.

Let's say that your plane is on the line and you're all set to fly. Use 50-70 ft. lines, the latter being preferred by the

author. Teamwork is the watchword. For best results, starting and flying is a 3 or 4 man job, each team member performing his duties simultaneously so as to get the model off in as short a time as possible after the engine has started. It is suggested that one man take care of air supply and choking, another the ignition, a third hold the model, and a fourth act as pilot on the other end of the lines. We also suggest that the pilot be ready at the center of the circle and not participate in the starting operation. As soon as the engine starts, the ignition should be shut off and wires removed at the same time that the air hose is unscrewed so that the model may be sent on its way without delay. The air hose connection to the jet should be of the screw-on type. Do not use a quick-off fitting. Either pump or pressure tank may be used, though the author prefers starting with the tank.

If a pump is used, obtain one of the heavy duty types. Connect the air hose to the blowpipe. Switch on the ignition. Choking or priming may be necessary for warm-up. This is best accomplished by covering the cowl airscoop with a rag or handkerchief. Cut off the outside airflow completely by lightly packing the rag in the cowl neck in such a manner that it may easily be removed if the engine begins to pop or start. If an air tank is used, starting will first be characterized by a low humming noise followed by a loud roar when running. With a hand pump, a loud blast may follow each stroke of the pump until the engine starts. To prime, simply spray some gas into the intake venturi or cowl and allow it to flow back into the combustion chamber. Do not overprime by allowing so much gas to flow into the chamber that it runs out of the end of the tailpipe when the model is tilted; you will not only flood the engine but also run the risk of pouring burning gasoline on your model. As soon as the engine starts, cut the ignition switch and remove wires and air hose immediately.

If an air tank is used for compressed air supply, starting is facilitated by closing off the cowl with a rag, turning on the ignition and finally the air. The engine should start to resonate within 5 seconds. When this happens, remove the rag and she should start with a roar as the choke leans out. If you do not get results after 2 or 3 chokings, something is most likely wrong with the setup. Apply the following trouble shooting the technique:

1. Check spark for rich steady arcing across plug.
2. Check engine assembly for damage, misalignment or loose parts.
3. Check valves to see that they function correctly and are not worn or chipped.
4. Check gas tank for leaks, tubing for excessive bends.
5. Check tank position, height below carburetor.
6. Check fuel line and connections for leaks.
7. Check carburetor to see that it is not misaligned.
8. Check air pressure.
   (a) Pump should be heavy duty type for sufficient pressure.
   (b) Tank pressure should exceed 50 psi.

If the engine backfires through the intake cowl, the valves may have been damaged or bent. Replace with new valves. A yellow flame in the exhaust is a sign that the engine is flooded from excessive choking or priming or from placing the fuel tank too high.

We include here a picture of a very

MICRO DIESEL

PRECISION .... POWER ....

IDEAL FOR
1. THIMBLE-DROME RACE CARS
2. CLASS A U-CONTROL
3. CLASS A or B FREE FLIGHT
4. STUNT & SPORT FLYING
5. MODEL BOATS
6. BEGINNERS & EXPERTS

NAVAL BRONZE BEARING ASSURES LONG LIFE. HIGH CARBON STEEL CYLINDER AND PISTON INDIVIDUALLY HONED AND LAPPED FOR PRECISION POWER. ASSURED ALL WEATHER PERFORMANCE THROUGH *BUILT-IN* VARIABLE COMPRESSION. NON-CRITICAL, EVEN CARBURETOR ADJUSTMENT FOR SMOOTH OPERATION.

NOW $14.95

PISTON DISPLACEMENT .130. REVOLUTIONARY NEW CATALYTIC FUEL LETS ENGINE IDLE AT 2000 R.P.M. AND ACHIEVE FLYWHEEL SPEEDS TO 12,000 R.P.M. BALL AND SOCKET BRONZE CONNECTING ROD. INCREASED PRODUCTION DUE TO MICRO'S GREAT POPULARITY HAS ENABLED US TO REDUCE PRICE TO $14.95.

WRITE FOR FREE LITERATURE. *MICRO-DIESEL-THIMBLE-DROME CONVERSION KITS AVAILABLE AT $3.00. ASK YOUR DEALER!*

MICRO-DIESEL CO. DEPT. M 609 WOODWARD AVE., DETROIT 26, MICH.

SPECIAL CATALYTIC FUEL $1.00 per pint

At Long Last...

A PRACTICAL

JET ENGINE

EVERY MODEL BUILDER CAN AFFORD TO OWN

INDIVIDUAL PARTS ARE AVAILABLE

The new M.E.W. 601 engine costs you practically nothing to build. In fact, most modelers will already have all the necessary parts and materials required to build this engine . . . a discarded CO_2 cylinder for a compression tank plus a few odd pieces of metal found in most scrap boxes. Entire jet engine can be built quickly and easily with ordinary hand tools. Small amount of welding is necessary.

The M.E.W. 601 engine runs from three to five minutes. Uses gasoline for fuel. Is easy to start . . . requires no ignition or external starting apparatus. Copyrighted plans for the M.E.W. 601 are fully illustrated and easy to follow. Complete plans only $1.00 postpaid. No CODs please.

MINNESOTA ENGINE WORKS
DIVISION OF CENTRAL ELECTRIC COMPANY
387 UNIVERSITY AVE. • ST. PAUL 3, MINN

THE KNIFE FOR A LIFETIME OF FUN

with handicraft hobbies

x-acto*

28 different shapes of knife, router and gouge blades — a new blade makes a new knife.

What's *your* hobby? Model-building? Whittling? Paper sculpture? Wood carving? You'll turn out a slicker job, quicker, and with a lot less spoilage, with hand-fitting, firm-grip X-acto Knives and Tools.

X-acto blades are supersharp, of specially tempered surgical steel. X-acto tools are scientifically right for their intended jobs. Choice of experts, safe for beginners, more than 20 million X-acto knives alone have been bought by hobbycrafters in the past ten years.

Buy an X-acto *set*, or buy a single knife and gradually accumulate a shopful...X-acto knives and blades are solidly established and always available. See the complete line at your hobby, gift, hardware or department store... they sell singly or in sets, for 50¢ to $50. *(Prices slightly higher in Canada.)*

X-ACTO CRESCENT PRODUCTS CO., INC.

440 Fourth Ave., New York 16, N.Y.

In Canada:

Handicraft Tools, Ltd., Hermant Bldg., Toronto

neat scale model of the Bell XS-1 rocket powered experimental fighter plane. The jet engine is mounted in the fuselage which is of wood and metal construction. To date, the builder has logged over 50 flights without serious damage, though no figures are available as to speeds. A three wheeled dolly is employed for takeoff.

Word was recently received that jet flying competition has been included in the 1948 A.M.A. rules. As a result, you should see an increasing number of entrants in the jet events during the coming flying season, and competition should be keener than it has been in the past. Gonna become a jet jockey?

World War I

(Continued from page 27)

lighter Breguet of 1917 to 55 mph in the later, heavier models.

The Breguet 14's fitted with full span automatic flaps on the lower wings landed as slowly as 30 mph in light condition. The term flap, in this case, may be a misnomer because this feature was intended to change the airfoil characteristics in the lower wing to compensate for changes in weight and speed. The primary purpose was to trim the airplane by automatically altering its lift characteristics, but at the same time had the effect of adding drag, thus slowing the airplane.

These flaps were usually adjusted to begin lowering at 70 to 75 mph. A more detailed description of them will be made later in this article.

Generally, pilots liked the entire Breguet 14 series. They were easy to fly, handled well in the air, and had one unusual feature—they were floaters. It has been said that few powered airplanes had a flatter gliding angle than the Breguet, something like 14 to 1. The ships just wouldn't sit down. Thanks to this feature, many a life was saved when a 14 lost its engine miles inside Germany and was able to glide safely to Allied territory.

On taking off, the ship lifted after a 300-400 ft. ground run, settled into its rate of climb with nose rather high. When altitude was reached, the 14 plodded steadily along.

The airplane was stable in all axes and under all load conditions. Fully loaded, it was a good rough weather airplane. Early production 14B.2 types fitted with a fin shaped roughly like a quarter-circle lacked good directional stability. This tendency was corrected by addition of the long Sopwith-type fin shown in the photographs.

Controllability of the Breguet 14 was average for a craft of its type. The ship responded well to rudder and elevator movements, but from the first, all models possessed an exceptionally good rate of roll. As the poundage grew in later models an attempt was made to preserve this good rate of roll by making it easier on pilots, and aerodynamically balanced ailerons were introduced. In practice, however, this didn't seem to make much difference, which accounts for a lack of consistency in aileron styles.

This attempt to improve controllability bore out the fact nevertheless, that as its speed increased the Breguet's controls stiffened, a common characteristic even in many of today's aircraft. All model 14's stalled gently, but with good warning, began to spiral broadly with torque (power on) then eased out as speed was gained. Without power they stalled pretty much straight ahead, leveling out as speed

HAVE YOU TRIED LEADER ACCESSORIES?

Rubber Tired Wheels With Aluminum hubs ½" to 1-5/16" Dia. 15c a pr. to 20c ea.
6 oz. Fuel Pump Bottles.....75c
Flex Shaft Needle Valve extensions.....35c
(Strait Shaft).....25c
Bell Cranks.....15c
Elevator Adjustment.....25c
Prop Nuts ¼" & 5/16".....5c
Universal prop Washers.....5c
Wheel Collar Hubs, Set.....25c
Wheel Collar, pr.....15c
Copper Gas Line 6".....10c
Slide Switch s.p.s.t.....25c
Flex Cable—3-ft. coil.....10c
Brass Flywheels
"A" $1, "B" $1.75, "C" $2.00

SEE YOUR LOCAL DEALER

LEADER MODEL SUPPLY CO.

6539 S. Ashland Ave., Chicago 36, Ill.

DEALERS...

YOU'RE ON THE RIGHT TRACK..

when you send for these two new catalogs, hot off the press!

1. CATALOG OF MODEL RAILROAD EQUIPMENT
2. CATALOG OF MODEL AIRPLANES, ENGINES, BOATS AND ACCESSORIES

SEND FOR YOUR COPIES TODAY

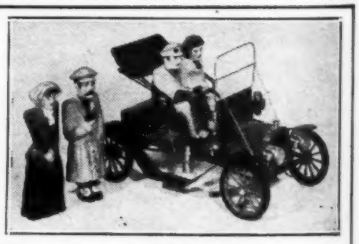
SKY HOBBY

INCORPORATED

804 GRAND AVE. KANSAS CITY 6, MO

NOTHING SOLD AT RETAIL

Dear Reader:
When answering advertisements, will you please oblige by mentioning MODEL AIRPLANE NEWS
Thank you.



Hudson Miniature's

1911 MAXWELL KIT

All parts ready shaped for easy assembly. Just the model for your den, mantel, or office. A true collectors item. Complete kit—**$2.50.**

More models available soon. Set of 4 Figures, unpainted—**$2.00,** painted—**$4.00.**

Dealers - - Jobbers write

SCRANTON HOBBY CENTER

315 Adams Ave. Dept. 6, Scranton 10, Pa.

increased. The Breguet resisted spinning, but could be spun nicely if flown into one—a spin was a controlled maneuver.

A list of specific performance, by model, is printed below:

Breguet Model 14 Performance

Model	Engine	Speed, M.P.H. Sea Level	at		Time of Climb to		† Ceiling, Ft.
			6500'	13100'	6,500'	13,100'	
14A.2	Renault 12Fcx 300 HP	112	109.5	104.5	6' 50"	18' 30"	21,000
14A.2	Renault 12Fcy 310 HP	116.5	114	107.5	7' 40"	17' 35"	20,000
14A.2	Fiat A12 285 HP	114	110	103	15' 00"	23' 50"	20,300
* 14B.2	Renault 12Fcx 300 HP	113.5	110	103	9' 15"	26' 0"	19,000
14A.2	Fiat A12 275 HP	123	119.6	103.3	9' 25"	23' 50"	20,350
14A.2*	Lorraine 12D 370 HP	128	122	115	5' 20"	13' 0"	23,000
14A.2*	Renault 12K 400 HP	134.3	126.4	119.5	6' 9"	15' 40"	23,000

Notes: * Indicates limited production of advanced models—contracts terminated at Armistice. † Indicates Theoretical Ceiling.

Wing Construction

Main supporting surfaces of the Breguet 14 series were in the form of an unequal span, two-bay biplane. The upper wing was made of right- and left-hand panels, joined over the fuselage centerline by 2 sets of pyramidal struts and without a separate centersection. Ailerons were carried in the upper wing. The lower panels attached directly to the fuselage.

Both wings were swept back 2.5°. The upper wing was back staggered 0.21 meters and set at 2.5° dihedral. Incidence of the upper wing was 4.5° in the center, and 2.5° at the tips. The lower wing carried 3° incidence at the center and 2° at the tips. There was no dihedral.

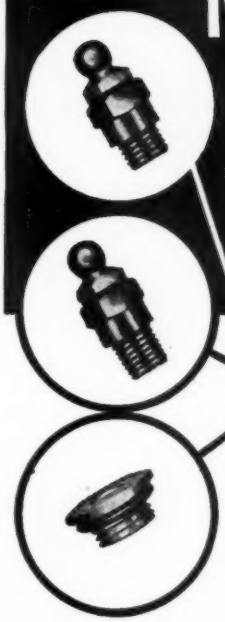
The 2 spars in both wings were made of rectangular section drawn aluminum tubing. All spars were equipped with internal ash compression members and steel sleeves riveted in place wherever strut fittings were attached. Aluminum tube compression struts were fitted in both wings at points of strut attachment.

All ribs were made of punched, 3-ply webs, except for 2 in each panel which were of stamped aluminum to resist particular stresses. None of the ribs were directly connected to the main spars but were connected laterally by veneer intercostals and cloth tape, the latter arranged alternately over and under the ribs. The leading edge was covered with 3-ply spruce back to the front spar, in both wings. A false rib, extending just aft of the front spar, was fitted between the full ribs. Trailing edge of both wings was made of spruce except for the tips and vision cutout outlines near the fuselage. Ash was used there. False ribs extending from the trailing edge forward to a point slightly ahead of the rear spar were fitted between each full rib on the underside only to aid in preserving the airfoil. Each wing was internally braced with single strand steel wire.

Ailerons, hinged directly to the rear spar in the upper wing, were built around a tubular aluminum main spar located at about 50% aileron chord. Aileron leading and trailing edges were wood; ribs were a continuation of the upper wing ribs.

The entire portion of the lower wing aft of the rear spar on certain Breguet 14's lowered automatically and provided

THERE'S A *long* AND SHORT TO THIS NEW ARDEN *FIRST*



THE ARDEN GLOW PLUG—an engineering achievement that has clicked with modelers throughout the nation—is now available with both long and short threaded sections.

plus

a GLOW PLUG ADAPTER which permits their use with Class C engines having the larger conventional ⅜" diameter plug opening.

No increase in ARDEN ENGINE PRICES

Catalog No.		
1-P-099	.099 engine with plain bearing crankshaft	$12.50
1-B-099	.099 engine with ball bearing crankshaft	$15.50
1-B-199	.199 engine with ball bearing crankshaft	$18.50

ARDEN GLOW PLUG PRICES

For Arden and other engines with same diameter plug opening and same thickness of head—

No. E-8001 S (short), ¼" x 32 T.P.I. Length of threaded section 5/32" ..... 85c ea.

For engines with same diameter plug opening but with thicker head than Arden—

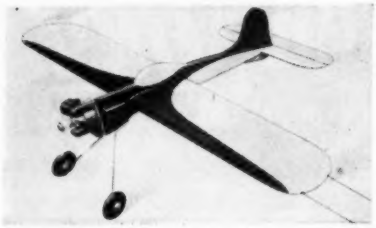
No. 8020 L (long), ¼" x 32 T.P.I. Length of threaded section 7/32" ..... 85c ea.

Glow Plug Adapter, for Class C engines with ⅜" x 24 T.P.I. plug opening, permitting use of long Arden Glow Plugs. No. 8015, fabricated of aluminum with copper-asbestos gasket 25c ea.

Ask your supply dealer or write us for information

MICRO-BILT INCORPORATED
DANBURY, CONNECTICUT

POPULAR SCIENTIFIC MODELS

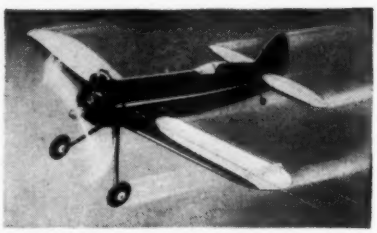


"STUNT ACE," Classes B-C. 40" Wingspan, Length 27". The Stunt Ace is capable of performing every stunt in the book—flies inverted 6" off ground—vertical eights—horizontal eights—spectacles—inverted inside and outside loops and overhead eights. Kit is 100% complete including rubber wheels and many finished parts.

$3.50

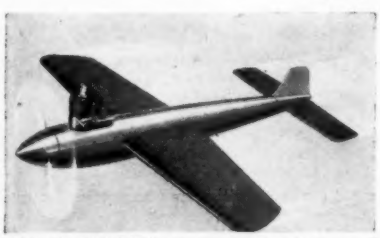
"CIRCLE KING", Wingspan 30", Length 27". Flies on 24-foot lines of cotton thread. The Circle King is a rubber-powered control-line model that is easily built from the complete kit which contains a double set of plans for a CO_2 or rubber-powered airplane.

$1.00



"CYCLONE", Classes A-B-C, Wingspan 36". Here's a proven champion as is evidenced by the hundreds of letters received from satisfied Cyclone owners. The Cyclone control-line model is excellent for stunt and training purposes. Kit is complete, containing every last detail right down to the smallest bolt and nut.

$4.95



"TRAIL BLAZER", Classes A-B-C, 24" Span, 6" Chord. For the thrill of your life fly the Trail Blazer. Kit is most complete comparing with models selling for twice the price. Finished fuselage, bellcrank, full size detailed plans and simplified instructions.

$2.95

BUY FROM YOUR LOCAL DEALER AND SAVE 20c MAILING CHARGE

SCIENTIFIC
MODEL AIRPLANE COMPANY
218-220 N-5 Market St., Newark, N. J.

a lift-increasing action. This "flap" was actuated by 12 rubber cords attached to the undersides of the ribs. Their tension was adjustable as operating conditions varied. The flaps were usually set to lower at about 75 mph.

Bombs were fitted on the 14B.2 lower wings in two rows of 8 on either side of the fuselage. The bomb shackles were incorporated in a plywood and metal housing, the nose of which extended beyond the wing leading edge. Bombs were dropped by a camshaft located just forward of the front spar. The camshaft was actuated by a chain drive which operated a pulley and shaft with rubber cord attached. The shaft to which this pulley and cord were attached was connected by a second driving chain to a quadrant and transmission gear in the gunner's cockpit. To load the bomb racks the gunner turned the cranking handle one revolution, until the rubber cord on the pulley was tightly stretched. This tension, in turn, rotated the first chain drive and fixed locking pins on the bomb shackles. To release the bombs in salvo, the gunner removed the locking pin in the crankhandle, the rubber cord contracted, rotating the pulley one revolution; the pulley shaft revolved, actuating the chain on the crankshaft in the bomb carrier, the bomb retaining pins were pulled out and . . bombs away!

The dropping gear was also fitted with a hydraulic cylinder which permitted the crankhandle to rotate a quarter-turn to release 4 bombs at a time, 2 on each side.

Breguets were also fitted, from time to time, with an alternate bomb gear which required carrying 2 large bombs inside the pilot's cockpit on his right. These were salvoed by the gunner by a retaining pin pulling mechanism.

To complete the wing structure, the 2 sets of interplane struts were made of streamlined section aluminum tubing, with fittings riveted to each end for attachment to spar fittings. Interplane wiring was conventional. Stranded steel cables in pairs were used, with wood strips inserted between them to aid in reducing drag.

Tail Assembly

Empennage of the Breguet 14 was conventional, consisting of a wire-braced fin and stabilizer to which were respectively attached a non-balanced rudder and balanced elevator. These members were made entirely of welded steel tubing, with symmetrical airfoils used in the fixed elements. All flight and supporting surfaces were fabric covered. Wings were fitted with brass eyelets on the lower surface of the trailing edge to permit moisture drainage.

That, then, is the Breguet 14—a good performing, steady plugging workhorse. An interesting sidelight is worth telling, however, before dismissing the Breguet. Toward the middle of 1918, when the Fokker D.VII came into prominence, Allied pilots began looking for balanced ailerons and elevators to help them spot the D.VII. As a result of quickly glancing at an airplane encountered over the front, many Allied pilots fired at Breguets, mistaking them for the D.VII!

And it was the Breguet's responsiveness to control that saved its pilots when they promptly verticaled in front of the overanxious Allied fighters to show off their insignia!

1948 NATIONALS!
Olathe, Kans. . . . Aug. 3-7!

(See page 30 for details)

ANNOUNCING!!!

HINKEL *STANDARDIZED CONTROL LINE CABLES*

7 STRAND — FLEXIBLE — STAINLESS STEEL

A STANDARD SIZE OF CABLE AND LENGTH OF COIL FOR EACH ENGINE CLASSIFICATION.

Get a copy of our copyrighted STANDARDIZATION CHART from your dealer or send us a 3c stamp to cover postage.

HINKEL HOBBY SPECIALTIES
MANUFACTURERS
4540 No. 39 St., Milwaukee 9, Wis.

FOR MORE SPEED, OWN AN OFFICIAL RECORD HOLDER

THE NEW BALL RACING ENGINE

Operates to Perfection On Glo-Plug Ignition

STILL THE SAME HIGH QUALITY AT THE NEW LOW PRICE OF

$29.95

DEALERS INQUIRE FOR NEW DISCOUNTS

Displacement .604 cu. in. Weight 15 oz.

Horsepower 1.1 Plus. Speed Over 20,000 R.P.M. Every Engine Tested for Break Horsepower.

Power your next model with an engine designed and built in the manufacturing center of the world.

See your dealer or order direct from

B&D RACING ENGINE LABORATORY
P.O. Box 262
Drayton Plains, Michigan

The Only Magazine Devoted Exclusively to the Active Aero-Modeler for 19 Years!

MODEL AIRPLANE NEWS

By Subscription Only $2.50 per Year

SPINIT The GAS MODEL STARTER *It's Super!*

ALSO FOR DIESELS

Completing your equipment with a SPINIT brings added flying pleasure. Features include fingertip automatic safety release, rubber cushioned drive, steel-spring powered. Try it . . . You'll agree a SPINIT is a *must* for your equipment.

IF IT WILL RUN, A SPINIT WILL START IT!

Thousands now in use. Standard for A & B motors. Heavy for C motors. Two blade models, short or long drive, $5.00; 3 blade models, $6.00. Write for folder. Order from dealer or direct.

Spinit Owners! Send us your worn or broken Spinit plus $2.00 and get a *new* Spinit, any model, in exchange.

STREED ELECTRIC CO.
1315 Harmon Place, Dept. M
Minneapolis 3, Minnesota

national national national national national national national national national national

Sensation of the
MODEL INDUSTRY
TRADE SHOW

GET IT FROM NATIONAL NOW!

GAD-JET RACER

Mr. Dealer: Rush your order for this 1948 all-metal hobbycraft sensation. Die cast, two-part aluminum body, aluminum rubber tired wheels. For cable or straightaway racing with CO2 engine or straight jet tube operation. Customers will be asking for GAD-JET soon and you can get quick delivery from NATIONAL.

Speed! Action! Thrills!

GAD-JET RACER, Complete and painted, with jet cartridge clip for jet power operation. Ready to run. $1.50

GAD-JET RACER, Complete and painted. With famous OK-CO2 engine and conversion kit for installing engine at home. Real engine operation. $6.95

GAD-JET RACER, Complete with CO2 engine installed, ready to run, including racing wire and bridle and suction cup center post. $9.95

GAD-JET RACER KIT, with jet cartridge clip, complete but not painted, (can be assembled in a few minutes) $1.00

Allyn Senior Jet Gun .75
Allyn Junior Jet Gun .39

Order by Telegram, Telephone, Air Mail. Regular Discounts.

National MODEL DISTRIBUTORS · 2516 N. Greenview Ave. Chicago

national national national national national national national national national national

Mite for MAXIMUM PERFORMANCE at MINIMUM COST

.099 'DIESEL' ENGINE

THE FINEST MODEL 'DIESEL' BUILT. COMPLETE WITH SHUT-OFF VALVE. NO ACCESSORIES NEEDED. MITES HAVE SHOWN THEIR SUPERIORITY IN SMALL CLASS 'A' FLYING FOR OVER 2 YEARS

.099 'GLO-MITE' ENGINE

THE FINEST IN 'GLO' ENGINES. ALL THE FEATURES OF 'DIESEL' MITE WITH A CYLINDER HEAD DESIGNED FOR MAXIMUM PERFORMANCE FROM A GLOW PLUG. COMPLETE WITH GLOW-PLUG

$12.50

FLY THE MODERN WAY - THE MITE WAY !

$14.50

SPECIFICATIONS

CLASS A - .099 DISPL.
POWER OUTPUT-9,000 RPM
(8"DIA.-6"PITCH PROP)
BORE & STROKE - .5 INS.
2.3/8" OVERALL HEIGHT 2-9/16"
2.6 OZS. WEIGHT 2.7 OZS.
DUAL EXHAUST

The Mite "Diesel"

The "Glo-Mite"

WHEN YOU BUY AN ENGINE. BUY A COMPLETE UNIT ! MITES COME READY-TO-RUN - NOTHING ELSE TO BUY !

Mite Distributing Co

DEALERS - CONTACT DISTRIBUTORS. IF NONE NEAR YOU, WRITE FACTORY
DEPT. M-58 257 WATER STREET BROOKLYN 1, NEW YORK.

CHICAGO'S
OLDEST NATIONWIDE
DISTRIBUTOR
is well qualified to serve you!
19 YEARS EXPERIENCE
Just use MODEL AIRPLANE NEWS as your catalog
• Planes
• Ships
• Race Cars
• Railroads
COMPLETE STOCK Engines Parts Supplies
WHOLESALE ONLY
TROST
Model Airplanes and Hobbies
3111 W. 63rd St., Chicago, Ill.
DEALERS: WRITE PHONE or WIRE

SUPER Performance!

$1.25 QT.
NOW AVAILABLE!
REGPINK RACING FUEL—
famous for the past twenty years, and used by record holders throughout the World—now available for your model engine.
MAXIMUM POWER — EASY STARTING
COOL RUNNING
SEE YOUR DEALER TODAY
or write us direct
REGGIE PINK, INC.
REGPINK PRODUCTS DIVISION
2077 SOUTHERN BOULEVARD AT EAST 180th ST. BRONX 60, NEW YORK, U.S.A.

528 PAGES
205 DIAGRAMS & PLANS
"Model Airplane Design" by C. H. Grant
THE COMPLETE INSTRUCTOR ON MODEL FLYING!
4th Printing
Only $3.75 at your favorite model or book store . . . or order from publisher, Air Age Inc., 551-5th Ave., New York 17.

HI-THRUST PROPS
Perfect air-foil section for higher speeds and longer flights. Sharp, clean edges. Beautiful natural wood finish, with pitch and diameter stamped on hub.

NEW 1948 PRICE LIST

Dia.	6" or 8" Pitch	10" Pitch
8, 9, 10, 11"	50	60
12, 13, 14"	60	70
7-3 and 8-3 Propellers		35c

Write for Inventory Check List
Thousands of Hobby Craft and Model Builders' Items
WHOLESALE ONLY
R. L. WEBBER CO.
4024-26 ELSTON AVE. CHICAGO 18, ILL.

Now! try

EXOL
Model Aircraft Power Fuel
DESIGNED FOR RACING ENGINES
A scientific blend of highest purity ingredients, as recommended by leading model engine manufacturers. Contains no gasoline or petroleum fraction of any type. Lubricated by highest quality castor oil.
EXPERIMENT INCORPORATED
Products Division
RICHMOND 2, VIRGINIA
Racing Fuels for Two-Cycle Engines

Design Forum

(*Continued from page* 13)

or 30 hp 2 cylinder horizontally opposed; empty weight 350 to 400 lbs.; loaded weight 600 lbs.; landing gear tread 48 in.

These figures include the plane's physical characteristics. He specifies the performance as follows: Maximum speed 100 mph; cruising speed 80 to 85 mph; stalling speed 45 mph; rate of climb 500 ft. per min.; ceiling 10,000 ft.; maximum range 250 miles. However, there are no calculations to indicate that these performance figures are accurate. They seem to represent what he desires rather than the plane's actual performance. We have often found that readers submit some very fine designs for planes but have not substantiated the performance claims with actual calculations.

In this particular case the plane is to carry only one person. Evidently Mr. Dixon feels that small size is the most important feature and that high performance can be sacrificed to some extent in order to achieve it. Naturally he wants the plane to fly as fast and as far as possible. This objective can readily be obtained by putting a high power engine into this small ship; but here again we run into difficulties. A high power engine is costly and expensive to run; it also requires a stronger and more carefully designed airplane. Mr. Dixon feels that 50 hp is the maximum he should use and we agree. Such an engine should be economical and yet supply sufficient power to give good performance.

Apparently he also feels that a stalling or landing speed of not more than 45 mph is the most important factor. Naturally, the slower a plane lands the safer it is and the easier it is to get in and out of restricted fields. If this plane could land at 35 or even 25 mph it would be even more satisfactory. However in any given airplane the maximum speed depends on landing speed. The lower you make the landing speed the lower the maximum speed will be. This means that a particular airplane has a definite speed range.

In designing your planes remember two basic facts: 1. Wing loading (weight of the airplane divided by wing area) determines landing speed for any type of wing and wing arrangement. So we see here that weight of the airplane of 600 lbs. and wing area of 50 sq. ft. will tell us what the landing speed will be. 2. The maximum speed is determined basically by the power loading for any given wing section and arrangement of airplane. Actually the maximum speed is determined by amount of power relative to amount of drag or resistance of the airplane to forward motion. However, for approximate calculation the wing area may be used in place of drag of the airplane, because the drag is approximately proportional to the wing area for any given wing section, wing arrangement and structural type. Light airplanes, similar to the one shown, have similar drag characteristics, so a formula using power and area factors with a proper constant will give surprisingly accurate results.

Now let us test the accuracy of Mr. Dixon's performance specifications using these simple basic formulas. Incidently these may be applied in working out the stalling speed and maximum speed of other airplanes. The three chief factors involved in these calculations are weight W, wing area A, and horsepower P. What is the landing speed of this airplane? Landing speed is represented by V_{min}, and the formula is:

$$V_{min} = 19.8 \sqrt{\frac{W}{A\ C_L\ B_1}}.$$

The value of C_L in the denominator represents the maximum lift coefficient of the wing. The symbol B_1 is the biplane factor. In figuring landing speed for a monoplane this should be left out.

In the formula, insert 600 for W, 50 for A, 1.35 for C_L and .9 for B_1. Quantity 1.35 is the lift coefficient for the *average* wing section used in light airplanes. Some thin wingsections give less, and others of greater thickness or camber give more. The range is usually between 1.0 and 1.7. Quantity .9 indicates that the biplane combination lifts only 90% as much per sq. ft. as a monoplane. This depends of course upon the gap between the wings, but it is accurate enough for the conditions in Mr. Dixon's design. The formula set up with these figures is:

$$V_{min} = 19.8 \sqrt{\frac{600}{50\ (1.35)\ .9}}.$$

Carrying through the calculation we have: $V_{min} = 19.8\ (3.14) = 62$ mph.

So we see that Mr. Dixon was not even close to the landing speed of his airplane. This speed is quite high for a small plane and will require an expert pilot. If a landing speed of 45 mph is imperative, then Mr. Dixon has only two alternatives; he must increase the wing area of his ship or reduce its weight. This is easily determined by the formula as follows: Insert 45 in place of V_{min} and solve for A.

$$45 = 19.8 \sqrt{\frac{600}{A\ (1.35)\ .9}}.$$

Rearranged this will be;

$$A = \frac{600\ (19.8)^2}{1.35\ (.9)\ (45)^2}.$$

Simplifying:
$A = 486\ (.194)$, or $A = 94.5$ sq. ft. So we see that Mr. Dixon must nearly double the wing area in order to achieve a landing speed of 45 mph.

This will make necessary a wing with approximately 17 ft. span, not including width of the body, and a chord of 2 ft. 10 in. If the body is approximately 2 ft. wide, total span will then be 19 ft. The aspect ratio (span divided by chord) will be slightly more than 6 for both upper and lower wings. This does not make an airplane of unreasonable size. However to keep the proportions right and provide a sufficiently long tail moment arm, it is advisable to lengthen the fuselage. Tail surfaces also must be increased in proportion to the wing area. The stabilizer should have an area approximately 15% of wing area. The rudder and fin should be about 8% of wing area.

Fig. 2 shows a revised design of Mr. Dixon's original design. Wing area and tail surfaces have been increased in size, as specified above, to give a landing speed of 45 mph. The wings have been moved back to give proper balance. The fuselage has been lengthened to provide a stabilizer moment arm of proper length.

The plane in Fig. 2 looks more commonplace than the original one, but perhaps this is the result of it being correctly proportioned, with every feature most efficiently located. Anyone can create a unique plane by distorting proportions, but there is no point in reducing efficiency and convenience just to be different.

The above calculations for a 45 mph landing speed are based on the airplane's gross weight of 600 lbs.

However, if the weight can be reduced it is possible that a landing speed of 45

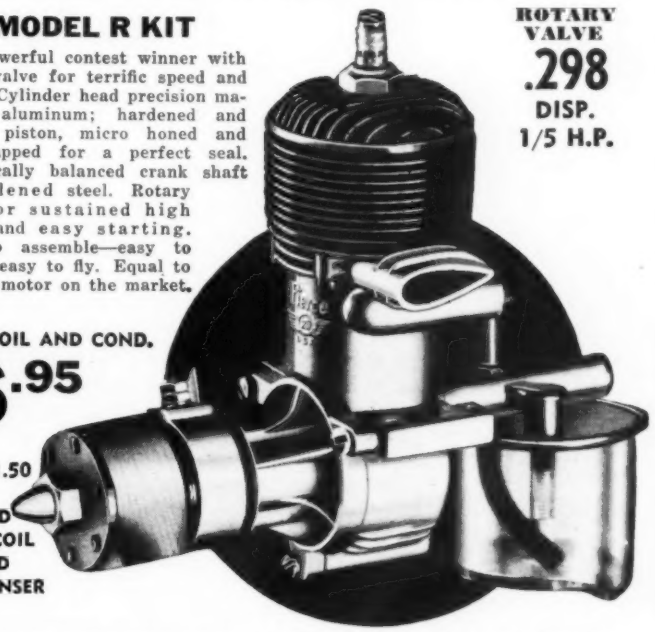
PIERCE SUPER POWER PLANTS now in KIT FORM

PRECISION PARTS EASY TO ASSEMBLE AND FAMOUS PIERCE QUALITY THROUGHOUT

The MODEL R KIT

ROTARY VALVE
.298
DISP.
1/5 H.P.

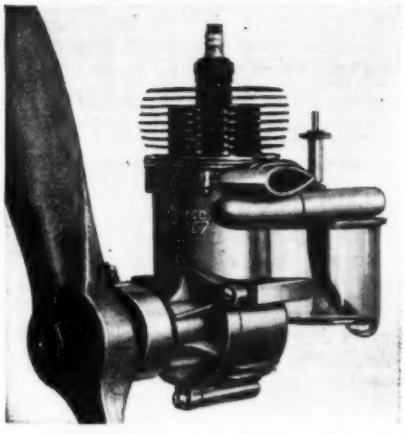
◆ A powerful contest winner with rotary valve for terrific speed and power. Cylinder head precision machined aluminum; hardened and ground piston, micro honed and hand lapped for a perfect seal. Dynamically balanced crank shaft of hardened steel. Rotary valve for sustained high speeds and easy starting. Easy to assemble—easy to mount—easy to fly. Equal to any $20 motor on the market.



LESS COIL AND COND.
$6.95

ADD $1.50 IF WANTED WITH COIL AND CONDENSER

THE PIERCE MODEL "J" KIT



.290 Disp. — 1/5 H.P.

Precision engineered for easy starting. Beyond question the greatest motor value in years! Hardened and ground steel piston, micro honed and hand lapped for high turbulance—high compression. Brings you expensive engine features at a popular price. Ask your dealer to show you this great new motor.

Less Coil and Condenser
$4.95
Add $1.50 if wanted with Coil and Condenser

Order from your dealer. If he cannot supply, write direct.

PIERCE INDUSTRIES

844 W. ADAMS STREET CHICAGO 7, ILL.

IF YOUR DEALER CANNOT SUPPLY, USE THIS HANDY COUPON

PIERCE INDUSTRIES, 844 W. ADAMS ST., Dept. MN-5 CHICAGO 7, ILL.

ENCLOSED FIND $..... for ENGINE KIT CHECKED BELOW
Please add 25c to cover postage and packing.

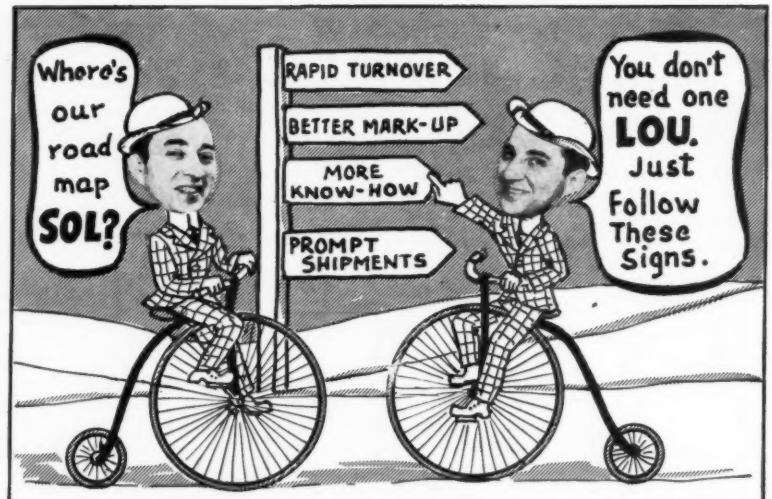
☐ Model R @ $6.95. Add $1.50 for coil and condenser.

☐ Model J @ $4.95. Add $1,50 for coil and condenser.

NAME .....

ADDRESS .....

CITY..... STATE.....



DEALERS: If you want to keep abreast of everything new in the industry, write in for "The Kramer Krier". It's FREE!

The signs point to bigger, better business when you stock KRAMER BROS. INC. "pre-tested" items. And if you want to start in the model business or improve your volume, KRAMER BROS. INC. will supply the "know-how" you need.

Dealers, Write Us Your Needs

KRAMER BROTHERS INC.

MODEL DISTRIBUTORS

125-27-29-31 Colvin St., Baltimore 2, Md.

FREE POSTAGE . . . FREE INSURANCE . . . 8 HOUR SERVICE

FREE A $5.00 FREE

MODELECTRIC "QUALITY" KIT

— FOR PEAK PERFORMANCE —

FREE WITH EACH MOTOR

KIT INCLUDES

- Modelectric "Hy-EFF" Coil—The MASTER
- Modelectric 200 Volt Metal Condenser
- Modelectric Molded Plastic Coil Mount
- Modelectric Electronic Spark Indicator
- Modelectric Manually-Locked H.T. Lead
- Modelectric Penlite Battery Box
- Modelectric Plastic Lightwgt. Ign. Wire—3'

Kit may be purchased separately for $5.00.

Super Cyclone GR	$18.95	McCoy 29	$19.50
Super Champion JH	17.50	McCoy 49	25.00
Hornet	35.00	McCoy 60 (New Model)	27.50
K & B Torpedo 29	18.50	*Sportsman, Jr.	14.95
Forster 29	14.85	Drone Diesel	14.95
OK Super 29	16.50	Arden .199 B. B.	18.50
OK Super 60	18.00	*Ohlsson 19	9.95
*OK CO_2	4.95	*Ohlsson 23	9.95
Pacemaker	24.95	*Ohlsson 60	11.95

* NO FREE ITEMS

ALSO COMPLETE LINE OF KITS AND ACCESSORIES

Simple mailing instructions: Print name and address clearly, list items, enclose check or money order. Free packing, handling and postage. No minimum order. No C.O.D.

THE EASTERN SUPPLY CO.

Box 615 New Britain, Conn.

Operated by Active Model Builders

FREE POSTAGE . . . FREE INSURANCE . . . 8 HOUR SERVICE

mph can be obtained with the original wing area specified. The maximum airplane weight for this wing area and landing speed is easily determined by the formula. Insert 45 for V_{min}, 50 for A and solve for W as follows:

$$W = A\ (C_L)\ (B_1)\left[\frac{V_{min}}{19.8}\right]^2.$$

$$W = 50\ (1.35)\ .9\left[\frac{45}{19.8}\right]^2$$

or weight W = 315 lbs. This means that in order to obtain a landing speed of 45 mph with this wing area, maximum weight of the loaded plane cannot exceed 315 lbs., an impossible figure.

Now let us check the maximum speed. The formula for maximum speed is:

$$V_{max} = 50\sqrt[3]{\frac{P}{A\ C_D\ B_1}}.$$

C_D is the drag coefficient. In airplane of this general design with external wing bracing, struts, wires etc., C_D = approximately .05. In other airplanes of very clean design with retractable landing gears and no external bracing C_D may be as low as .01. Usually clean airplanes do not fall below .02.

The drag of a biplane is slightly more than a monoplane due to wing interference, so that B_1 in the formula represents the conversion factor for a biplane, which equals 1.1. Inserting the numerical values in the formula we have:

$$V_{max} = 50\sqrt[3]{\frac{50}{50(.05)\ (1.1)}}$$

$$= 50\sqrt[3]{18.2} = 50\,(2.62).$$

Therefore, V_{max} = 131 mph. Here we see that the maximum speed with this small wing area greatly exceeds Mr. Dixon's estimate. But let us insert the new wing area value of 95 sq. ft. (the amount required for a landing speed of 45 mph with a weight of 600 lbs.) in the formula:

$$V_{max} = 50\sqrt[3]{\frac{50}{95\ (.05)\ (1.1)}} = 50\sqrt[3]{\frac{50}{5.24}} = 50$$

(212), or V_{max} = 106 mph. From this we see that the maximum speed with wing area necessary to give 45 mph landing speed is very close to Mr. Dixon's estimate. The whole problem as indicated by the formula hinges on the plane's weight. If the airplane is to weigh 600 lbs. the wing area must be increased to 95 sq. ft. in order to get the desired performance.

The formulas for ceiling or maximum altitude and rate of climb are much more involved and do not lend themselves to discussion here. However those who wish to understand them may refer to any one of a number of text books on airplane design. Actually, these two values are not as important to the amateur designer as the landing and maximum speeds. References to charts and standard works, however, will indicate that this plane with the wing loading and power loading specified will have a rate of climb of approximately 1000 ft. per min.

Complicated calculations are also required in order to find the cruising speed. However, in most cases a value of 80% to 85% of the maximum speed is accurate. The formulas used here may be used to determine the basic performance values of maximum speed and stalling speed for any airplane you may care to design. The only changes that may be required are

the values of C_L in the stalling speed formula, and C_D in the maximum speed formula. The formulas then will be approximate but will not take into account all factors operating. For more accurate results we refer you to books on airplane design.

* *

Gerard Beauchamp of Montreal, Canada, has a few questions about a R.O.W. (Rise Off Water) gas model he intends to build. His plane is to be a low wing type and is to be powered by an *Atom* engine. He wants to know the correct airfoil to use and other design features.

It is always wise to use a high lift airfoil on this type of plane so that it will take off quickly with a minimum run on the water. We suggest a Grant X8 which has a very high lift coefficient and also a comparatively low drag. This wing section is popular among model builders and has held many records. The wing should be set at 3° to the thrust line—the *thrust line* being the line thru the center of the propeller shaft and parallel with it. Do not confuse this with the *axis of the fuselage*, which may or may not be parallel with the thrust line. This has confused many model builders. Often they draw the fuselage axis and set the wing and tail at specified angles relative to it. This is a mistake. All wing and stabilizer angles should be measured *relative to the thrust line only*. In order to obtain sufficient stability the stabilizer area should be 30% of wing area, the fin area 7% of wing area. These are basic figures and are satisfactory for the average airplane, but they vary in planes of different designs. The figures given usually work out with complete satisfaction.

SE-4 Racer

(*Continued from page 23*)

mined by making templates. Carve the fuselage to shape with a sharp knife; check the sections often, and finish the outside with a final sanding. Note that the headrest is an integral part of the fuselage.

The tail surfaces are built up directly over the plans. 1/16 in. flat stock of the widths shown is used throughout these parts. A flat section was used on the model illustrated with fine results, but a symmetrical airfoil can be formed by using additional 1/16 in. sq. strips on each side of the basic empennage ribs.

While the tail surfaces are drying, construct the wings. Left halves of both main panels should be drawn by tracing the right halves shown; reverse tracings and draw through and you will have plans for the left halves.

Now we cover the tail surfaces on each side, taking care that the grain of the tissue runs spanwise on the elevators and lengthwise on the rudder. Overlap the edges neatly so as to leave no exposed wood parts. Since lightness is always a primary goal, the writer used khaki colored tissue of the finest available quality for both empennage and wings.

All papered surfaces are sprayed lightly with water after covering. Always spray both sides so they may dry at the same time and thus prevent undue warping. If warping results, hold the affected part over a steaming teakettle and warp back to correct shape. Three coats of thin clear dope were applied to the author's model.

When all flying surfaces are dry, cement two lower wing panels to one of the centersections; dihedral angle should be exactly 5/16 in. at the tips. Form a

GMCO NOTES

VOLUME 3, NO. 6 — MAY, 1948

GAS ENGINES

Class A

*Arden .099 P. B.	$12.50
*Arden .099 B. B.	15.50
*Arden .199 B. B.	18.50
*Bantam .199	16.50
*Ohlsson 19	9.95

Class B

*Ohlsson 23	$ 9.95
*Sportsman Jr. 36	14.95
*OK Hothead	12.50
*McCoy 29	19.50
*De Long 30	15.50
Super 29	16.50
*Bullet 100	8.50
Thor 30	9.95
*Forster 29	14.85
*K&B Torpedo 29	18.50
*K&B Torpedo 24	16.50
*Mohawk 29	8.95

Class C

*Ohlsson 60	$11.95
*OK Raceway 60	23.00
*Vivell 35	18.00
*Dooling 61	35.00
Dennymite 57	9.95
*Wasp-Twin	29.50
*Hornet 60	22.75
*McCoy 49	25.00
*McCoy 60	27.50
*Madewell 49	12.50
*OK Super 60	18.00
*OK Twin	49.00
*Super Cyclone S.I.	18.95
*Super Cyclone D.I.	19.95
*Contestor RV	18.50
*Forster 99	24.75
*Sportsman Jr. 36	14.95
*Sportsman Sr. 54	16.95
*Super Champion JH	17.50
*Spitfire 60	24.95

*Less coil and condenser

DIESELS

Mite A	$12.50
Drone B	14.95
Air-O-Diesel	16.50
Deezel A	12.95

JET

Dyna Jet Standard	$24.50
Dyna Jet Red Head	35.00
CO_2 Engine	4.95
Campus A100	12.50

F.F. GAS KITS

CLASS A

Buccaneer 36	$ 1.95
American Ace 36	1.95
Super A Skyrocket	2.95
Brigadier 38	1.95
Piper Cub Coupe	1.95
Mike	2.00
Easterner	2.50
Runt	2.50
Aero Champ	2.50
Miss Tiny	3.25
Crusader 42	1.95
Ardent Air	2.00

CLASS B

Buccaneer 48	3.50
Brigadier 58	3.95
Buccaneer Spec.	3.95
Playboy Junior	3.25
Zipper	5.95
Jersey Javelin	3.95
Humdinger	3.95
Westerner B	4.50
Roamer	2.95
Pacer	2.95
Diamond Demon	2.00
Brooklyn Dodger	3.95
Powerhouse	4.95
Coronet	2.50
Airfoiler	3.95
Interceptor	2.98

CLASS C

New Buccaneer St'd	$5.95
Custom Cavalier 108	17.50
Piper Cub Super Cruiser	10.95
Flamingo Amphibian	9.95
Playboy Senior	6.00
Westerner C	5.95
Pacer	4.95
Mercury	5.50
Stinson Reliant	17.50
Buzzard Bombshell	9.95

RADIO CONTROL

Good Brothers, complete (Less Batteries) $59.50
Aero-Trol, complete (less Batteries) $49.50

BELL RADIO CONTROL

Packaged radio control ready for installation. $120.00.

GMCO YOUR QUALITY SUPPLIER

Buy from GMCO—the Model Supply House with the finest equipment in the USA. Our 21 years of experience guarantees you the utmost value for your money—quickest service—kits, motors and supplies you can depend on. Don't forget GMCO's outstanding catalogues—for planes & race cars, one for ship models, one for railroads. Only 25c each.

SUPPLIES AND ACCESSORIES

ALUM. TUBING

Dia.	per ft.
1/16"	10c
3/32"	10c
1/8"	12c
5/32"	12c
3/16"	15c
1/4"	18c

Universal Needle Valve 75c
Flexible Needle Valve $1.00
Splnit Starter 5.00
U-Reely Control 7.50
Perrycraft Tank 2.50
Froom Tanks 1.00
Alum. Prop Spinners, 13/16" 30c; 1⅛" 75c; 1½", 1.00; 2" 1.15; 2¼" 1.25; 2½", 1.50; 2¾" 1.75
Hi-Tension Lead .15
Ignition Wire per ft. .03
Arden Glow Plug .85

POWER PLUS WET CELLS

Free-Flitter $2.25
Super-Fliter 2.95
Race Car Special 5.50
Booster 3.50
Aero lock lead .25
B.B. Washers .10
Steel Music Wire, all sizes, 3 ft. lengths.
Spark Plugs ea. .50
Silkspan 00 .05
Silkspan GM 3 for .25

TREXLER AIR WHEELS

2" dia.	$ .50
2½" dia.	.60
2¾" dia.	1.00
3" dia.	1.25
3½" dia.	1.50
4½" dia.	1.75
Aero Cond.	.35
Smith Cond.	.35

Paper Cond. .25
AustinTimer 1.50
Arden Timer 1.85
Aero Lt. Wt. coil 2.50
Arden Coil 2.50
Competitor 1.95
New Wilco 1.95
Aero Qual. 3.00
Aero Twin 4.00
Firecracker 2.75
Smith Dual 4.50
Fuel Shut Off Valve 1.00

PROPELLERS

Flo Torque (Low Pitch)
8"to14" ea. $ .35
16" & 18" .75
Hi-Ball (High Pitch)
9"to14" ea. .35
Testor's Props
8"-14" each .50
Rite Pitch
8" to 11" .50
12" to 14" .60
Diesel Conversion Kit for Arden .099 3.00
Arden .199 3.50
Reggie Pink Fuel qt. 1.25
(Shipped Express Collect)
Two Speed Control Line Supplies. Electraline Wire, .011 or .014" dia., 150 ft. 1.50
Relay 2.00
Ohlsson 2-Speed Points 1.75
Stranded Steel Control Line, 7 Strand, flexible, non-kinking, .015" dia., 70 ft. 1.00
.020" dia., 70 ft 1.15

PURE BROWN NATURAL CONTEST RUBBER AT PRE-WAR PRICES

⅛" flat, per ft $ .01
3/16" flat, per ft. .01⅛
¼" flat, per ft. .02

VECO WHEELS
(With Turned Alum. Hubs)

⅞" dia.	20c pr.
1⅛" dia.	25c pr.
1⅜" dia.	30c pr.
1⅞" dia.	50c pr.
2⅜" dia.	60c pr.

VECO AIR WHEELS

2½" dia., pr.	$2.15
3½" dia., pr.	2.50
4½" dia., pr.	2.75

Veco Bell-crank 25c
Toggle Switch 45c
Slide Switch 30c
Tip Jack 12c
Pee Wee Clip 10c
Terminal clip, 2 5c
Alligator clip 10c
Solderless Plug 12c
Lugs, 12 10c
¼" or ⅜" spark plug gasket, 2 5c
Elevator Hinges 30c
Swivels, Class A, pc. 15c
Swivels, Class B, C, pr. 30c

SPONGE RUBBER WHEELS

2" dia.	40c
2½" dia.	50c
3½" dia.	60c

COLORED DOPE

11 Ass'td. Colors: 1 oz., 15c; 2 oz., 20c; 4 oz., 30c; ½ pt., 55c pt. $1.00
(Wood filler same price as colored dope.)

CEMENT, CLEAR DOPE, THINNER. BANANA LIQUID

1 oz., 15c; 2 oz., 20c; 4 oz., 30c; ½ pt., 50c; 1 pt. 70c

Minimum Wood order $1 Include 25c packing charge

BALSA 36" STRIPS

1/16 x 1/16	5c	5/16 x 5/16	5c
1/16 x 1/8	5c	5/16 x 3/8	6c
1/16 x 3/16	4 5c	5/16 x 1/2	8c
1/16 x 1/4	1c	5/16 x 5/8	9c
1/16 x 3/8	4 5c	5/16 x 1	12c
1/16 x 1/2	3c	3/8 x 3/8	7c
3/32 x 3/32	6 5c	3/8 x 1/2	10c
3/32 x 3/16	1c	1/2 x 3/4	15c
3/32 x 1/4	3 5c	1/2 x 1	14c
3/32 x 3/8	2c	5/8 x 5/8	15c
3/32x1/2	2 1/2c	5/8 x 1	18c
1/8 x 1/8	4 5c		
1/8 x 3/16	3 5c		
1/8 x 1/4	2 5c		
1/8 x 3/8	3c		
1/8 x 1/2	4c		
1/8 x 3/4	5c		
1/8 x 1	6c		
3/16x3/16	4c		
3/16 x 1/4	4c		
3/16 x 3/8	5c		
3/16 x 1/2	6c		
3/16 x 3/4	8c		
3/16 x 1	9c		
1/4 x 1/4	4c		
1/4 x 3/8	5c		
1/4 x 1/2	7c		
1/4 x 3/4	10c		
1/4 x 1	12c		

BALSA 36" PLANKS

1/2 x 2	24c
3/4 x 2	25c
2 x 2	65c
1/2 x 3	33c
3/4 x 3	38c
2 x 3	1.00
3 x 3	1.50

BALSA 36" SHEETS

1/32 x 3	7c
1/16 x 2	7c
3/32 x 2	8c
1/8 x 2	9c
3/16 x 2	11c
1/4 x 2	13c
3/8 x 2	14c

1/32 x 3	11c
1/16 x 3	11c
3/32 x 3	13c
1/8 x 3	15c
3/16 x 3	17c
1/4 x 3	19c
3/8 x 3	27c

BALSA BEVELED 36" TRAILING EDGES

3/32 x 3/8	3c
1/8 x 1/2	4c
5/32 x 5/8	5c
3/16 x 3/4	6c
5/32 x 7/8	7c
1/4 x 1	8c

POWERED BOATS

Chris Craft $4.95
O-Gee 10.95
O-Gee Kit 5.95
Harco 40 4.95
Sea Elf 5.50
Sea Bird 4.95
Sea Bird Hardware Kit 2.95
Sea Gull 7.50
Jeeno 22.50
Owens 4.95

U-CONTROL GAS KITS

Capitol 400	$ 4.95
Laird Super Solution	2.25
Hotrock	3.95
Dronette	3.50
Stunt Ace	3.50
Speed Wagon	4.95
Miss Liquid Dynamite	1.95
Flying Maniac	6.95
Perky A	2.00
Stardust	10.00
The Bat	2.95
The Bug	1.50
A. J. Fireball	7.95
Miss Behave	3.95
Beechcraft	9.95
Super Zilch	4.95
Junior Cruiser	5.95
Falcon Sporster	3.95
Fokker D-7	7.50
Bearcat	6.95
Cyclone	4.95
Super V Shark	4.95
Whirlwind	7.95
Bipe Trainer	3.95
Ercoupe	7.50
Baby Miss Behave	2.95
Answer	2.00
P-51 Controliner	7.95
Navion	3.95
Gr'man Bearcat F8F	5.95
Skystreak	1.95
Skycycle	7.50
Navion (Capitol)	7.50
Streamliner	4.00
Sharpie De luxe	2.00
Fireball	3.95
Custom Cruiser	10.00
Orbit	6.95
Greyhound	3.95
Zing	4.95
Speedster	3.95
Cadet	3.95
Trainee	3.95
Curtis-Hawk P6E	6.95
Whippet	3.95
Tyro	3.95
Strato Cat	5.95
Fireball Fighter	8.00
Vought Corsair	6.95
Gee Bee	2.95
Circle King	1.00
Stunt Ace	3.50
Sky Buggy	5.95
Demeco Special	7.95
Baby V Shark	2.95
Super Cinch	2.95
Monocoupe	4.95
Lil Zilch	2.95
Buster	2.50

RUBBER POWERED KITS

Stinson Voyager 150	$1.50
Cessna 140	1.50
Culver V	1.50
Interstate Cadet	1.50
Luscombe-Silvaire	1.00
Piper Cub	.65
Bearcat	2.50
Ercoupe	2.00
Zephyr	1.00
Gollywock	1.35
Jabberwock	1.50
Baby Fleetster	1.25
Thermaller	1.00
Stinson L-5	1.50
Folkerts Racer	1.50
Piper Cub	1.00

SHIP MODELS

Grand Banks	$ 3.00
Sail King	2.00
Bluenose	3.50
Preston	4.00
Campbell	4.00
Queen Mary	8.50
Liberty Ship	1.50
Augusta	1.50
Constitution	34.00
Sea Witch	31.00
Sub Buster	9.00
Firebrat	13.00
Varney LST	5.00
Super Elco PT 10	5.00
Submarine	2.50

RACE CARS

McCoy Invader	$42.50
Racer D-1	45.00
McCoy Racer	42.50
McCoy Railton Jr.	29.50
New Dooling Racer	45.00
Pacemaker	55.00
Reuhl	24.95
Thimble Drone	3.95

NOTE NEW GMCO ADDRESS! WHEN IN N.Y.C. VISIT GMCO'S NEW AND LARGER HOBBY QUARTERS.

SEE THE LATEST MODELS. ASK QUESTIONS. ORDER FROM GMCO'S TREMENDOUS STOCKS.

MAIL THIS COUPON TODAY

GMCO MODEL SUPPLY, INC., (MA-5)
(Modelcraft Hobbies)
166-21 Jamaica Ave., Jamaica 3, N.Y.
(Tel. JAmaica 3-9140)

Please rush at once (check catalogues wanted—25c each). ☐ Plane & Race Cars ☐ Ship Models ☐ Railroads. Attached is list of items I need. Send them right away.

NAME .....
ADDRESS .....
CITY ..... STATE .....

TO ORDER

Send full remittance or send $1.00 and we ship C.O.D. for balance. We prepay postage and insure all orders over $1.50. TWENTY-FOUR HOUR SERVICE.

WESTERN DEALERS

FAST * WHOLESALE * SERVICE

Leading Lines of Modelmakers' Supplies, Including

ATWOOD, AIR-O, AERO-SPARK, AIR AGE BOOKS, AIR-AUTO-MARINE, AIR-FLO, ALL-STAR, ARISTOCRAFT, AMECO, AMERICAN JR., AUSTIN-CRAFT, BEACON, BANTAM, AEROGLOSS, CONSOLIDATED, CANNON, CHUPP, C & R, DELONG, DAVIES, DOOLING, CONTESTOR, CADET, CAPITOL, CHAMPION PLUGS, EAGLE, EDCO, E-V, FALCON, FLO-TORQUE, FROOM, GIRARD, HORNET, HERKIMER, HECO, HURRICANE, JASCO, McCOY, MELCRAFT, MEGOW, MONARCH, POWER-PLUS, RAY, MINIJET, SCIENTIFIC, SNAFU, SULLIVAN, TESTOR, TOPPING, TORPEDO, VIVELL, X-ACTO AND MANY OTHERS

Send for Large Wholesale Lists

"HOBBYCRAFTS"

DISTRIBUTORS

1327 J ST. SACRAMENTO 14, CALIF.

Strate Kut Stripper

85¢ *Postpaid* (WITH 2 BLADES)

You'll buy this twin blade BALSA STRIPPER

because

• It's a time-saving device every model builder needs! • It offers you an improved method of slitting balsa accurately. • It is adjustable to cut widths 1/16 to 1/2"; up to 1/8" thick. • It has not one, but *twin* cutting razor blades. • Its first blade is set to slit balsa sheet half thru. • Its second blade guides the piece & finishes the cut. • It operates best clamped in a vise or fastened to workbench.

Order from Your Dealer, or Direct

BROADFIELD AIR-MODEL CO. Box 453 Hempstead, L.I., N.Y.

THE NEW SPRING SKID

A "MUST" ACCESSORY FOR YOUR MODEL

25c AT YOUR DEALER

- Large Type—3⅝ overall length.
- Small Type—2½ overall length.
- Spring Steel, with holding loop for one man U-control holding devices.
- Vibration-proof thru exclusive new tempering process.
- Simple but foolproof mounting hints supplied with each unit.

TRY OUR STEEL TUBE CUSTOMOUNT ENGINE MOUNTS SPECIFY ENGINE MAKE $1.75

REGULAR DEALER & JOBBER DISCOUNTS AVAILABLE

RITE-FLITE SPECIALTIES 3850 W. 111th St., Inglewood, Calif.

THE NEW ELECTRO-MITE

A Revolutionary Coil

FEATHERWEIGHT! World's highest power to weight factor—only 2/3 ounce.

TINY! 13/16 x 1 inch. For your streamlined jobs.

EFFICIENT! For pen cell operation of all engine classes—and here is **proof** of its incredible performance!

"Our success has been perfect with them up to and including racing engines. As yet we have found them to be as hot or hotter than any coil we have used".

—Mr. Andy O. Campbell, Model Air Depot U-Control headquarters, Oklahoma City, Okla.

$1.95 Factory Guaranteed

See Your Local Dealer First. You may order direct from factory also. Postpaid. Airmail service, 15c extra. DEALERS: Please order direct.

ELECTRIC MINIATURES
931 West 80th St.
Los Angeles 44, California

complete upper wing likewise and allow to dry. Cut a notch in the tail end of the fuselage to receive the elevators and cement these in place; note that there is neither positive nor negative incidence in the elevator. The rudder is cemented in place at this time. A final sanding of the fuselage will prepare that part for color doping as the wood filler was applied before hollowing.

When the final coat of dope has dried, cement the lower wing in place. Take care to align the wings perfectly. While the wing is drying in place, the 2 centersection struts may be made. Check the side view: you will see that the main portion of the struts are of one piece while the streamlined strut ends are cut from a separate piece. Hard balsa is used for the strut centers, and pine is used on the ends for greater strength. The centersection struts, one to each side, are made exactly as are the outer interplane struts except that the lower streamlined end is omitted. All struts are 1/8 in. thick, streamlined with sandpaper, and treated with 2 coats of wood filler. The position for the centersection struts is shown on top view. Cut a hole through the fuselage and cement the struts firmly in place with the nower end against the inside of the fuselage. Line up the centersection struts from all directions and don't spare the cement. Right now is the time to color dope the C. S. struts; a light cream was used to good effect on the original model.

Cut a piece of 1/2 in. thick balsa to shape for a nose block and fit it into place. Do not cement in place at this time; merely see that it fits.

While the top wing is drying in place, prepare the 2 interplane struts exactly as you did the C.S. struts except that the lower streamline portion is added. These are cemented in place with plenty of cement. When they have dried in place, dope them with several coats of the same cream colored dope.

The landing gear struts are next; they are prepared from 1/8 by 1/4 in. pine Streamline them and cut them just 1/8 in. longer than shown on the plan side view. Cut holes in bottom of the fuselage to take these struts and cement them firmly in place. Check the outward splay with the reduced scale front view. The spreader bar is cut from 1/8 by 5/8 in. pine; streamline this bar and cement in place on the landing gear struts. .040 music wire is bent as shown in the front view and is cemented to each end of the spreader bar to act as the axle. Axles of this type are strong, unobtrusive and capable of taking hard landings. Rub in some wood filler to the landing gear parts and dope a shiny black. The tail skid is a piece of bamboo bent over a candle flame. Cement in place and dope black. Check the side and top views and cut 2 small tailplane struts from hard 1/8 by 1/16 balsa. Streamline these little struts, sand smooth, cement in place and dope cream.

Now add some more cement to the points of contact between the L. G. struts and the C. S. struts on the inside of the fuselage. This done, cement the nose block in place and dope dull black. A small plastic windshield may be cut to shape and cemented in place. The wheels may be purchased or carved, doped with the tires dull black and the centers dark khaki, and installed on the axles with a washer or two as bearings. The axle tips are bent up with a pair of sharp-nose pliers.

Space requirements cut the plans to a minimum, and the prop was not included,

but carve a conventional 2 blade propeller from a block of hard balsa that is 5/8 by 1-1/2 by 7 in. overall. Install with 8 strands of 1/8 in. flat rubber. The rear rubber hook is a short length of 3/32 in. diameter hardwood dowel placed through the fuselage just forward of bulkhead C as indicated. The model shown weighed in at just under 3 oz. A heavier or lighter mode[1] will require correspondingly more or less rubber.

This *SE-4* is, if constructed with care, a snappy and excellent flyer. The monocoque fuselage adds beauty not seen on the usual rubber-powered flying scale model. British cocarde were added, though more exact wing insignia would probably be the Union Jack as was carried by British jobs during the first few months of the First War. No insignia other than the large block letters (black on white rectangle) is carried on the rudder. The vertical tail stripes did not come into vogue until May 1915, so it is unlikely that any *SE-4* types were so marked. The *SE-4* is believed to have been dropped as a production job because of certain very evident obstacles to mass-production techniques then in use.

FLYING: Try a few shoulder-high glides into tall grass. Correct any stalling or diving tendency with small weight on the nose or tail. When a perfect glide has been achieved, put in 50 turns and launch by hand. When balance satisfies, wind 'er to capacity and try an R.O.G. flight. You will find the *SE-4* to be a dandy flyer if you have been careful to follow these plans. Not only will you have a fine flyer, but you will have an unusual addition to your collection of scale models. The *SE-4* will hold its own in any beauty parade.

Fuel for Diesels

(*Continued from page* 32)

kerosene, which probably acts as a deadener to prevent pre-ignition. We have tried this *Micro-Diesel Catylytic* fuel in several engines and found it excellent. Once again we see previous experience in the diesel field applied to our tiny motors. Of course this fuel also uses ether, and the ether percentage is probably high.

Experience with this and other fuels has led us to the conclusion that much better fuels than are available can be developed, and ultimately will be. We spent a great deal of time with Leon Shulman working on the development of a new type of fuel for the *Drone Diesel*. Here are the results of some of the tests we ran. You will note that these tests were only moderately successful. However, with the cooperation of engineers from a large fuel company we did ultimately find the formula for an excellent fuel which will be given later.

Our first attempt was to see if the engine could be made to run on a straight diesel truck fuel. For this we started the motor on regular fuel and gradually added a lightweight grade of diesel truck fuel until the engine was running entirely on the latter. We did manage to operate the engine under these conditions, but found that we had terrific pre-ignition and practically no power. Next we added to the fuel about 2% of ethyl nitrate, a highly volatile diesel additive. This was found to operate moderately well but to be difficult in a starting. It also displayed the annoying habit of blowing head gaskets, indicating that, if anything, it was probably too good as a fuel. If you operate

NOTHING ELSE TO BUY • JUST BUILD AND FLY

25 BIG GAS ITEMS

$9.95 POSTPAID

MOTOR 'Genie' or 'Denny'
- Lancer U-Control
- $2.50 Ign. Coil
- Condenser Prop.
- Ign. Wire • Lugs
- Sullivan Control Wire
- Rubber Wheels
- Manual on Control Flying
- Identification Tags
- Catalog • Cement
- Dope • Nuts • Bolts
- SAE 70 Oil
- Booklet On Engines
- Motor Hints Chart
- Packing & Postage
- Hi Tension Lead
- Spark Plug
- Batteries
- Control Handle
- Full Size Plans
- Skyway Knife

"THE LANCER" CLASS A·B·C 24" WINGSPAN

LINE CONTROL

New type construction. Just 4 solid balsa planks for body and wings. All parts printed or semi-cut. Complete with full-size plans, rubber wheels, control handle. Kit alone ..... $3.95 P.P.

YOUR CHOICE

Of Either Motor with $9.95 Outfit
Class 'B' GENIE-29 or Class 'C' DENNYMITE
Motor alone $6.95 P.P.

P.P. $12

DELUXE OUTFIT
INCLUDING
ALL 25 ITEMS AND
OHLSSON '23' or '19'

20 ITEMS FREE WITH GAS MOTORS

● 3 Pc Wrench Set ● Ign. Wire ● Nuts ● Coil ● Condenser ● Lead ● Mounting Bolts ● Lugs ● Booklet on Motor Repair ● Steel Ruler ● Model Pliers ● Plastic Handle Screw Driver ● Ident. Tags ● New Catalog ● Postage and Insurance ● 100ft Control Wire ● Batteries

Arden .099 P.B.	$12.50	Bullet .275	$ 9.00
Arden .099 B.B.	15.50	Thor 30	9.95
Arden .199 B.B.	18.50	Pierce 29 'R'	12.95
Atom .099	15.50	Ohlsson 60	11.95
Bantam .199	15.00	Dennymite 57	6.95
Thor-B Kit	6.95	Mohawk 'B'	8.95
Ohlsson 19	9.95	Hornet	22.75
Ohlsson 23	9.95	McCoy	26.00
De Long 30	15.50	McCoy 49	25.00
Madewell 49	$12.50
New Pierce "B"	9.95
Super Cyclone S.I	18.95
Super Cyclone D.I	19.95
McCoy "29"	19.50
Mite Diesel	12.50
Drone Diesel	14.95
Foster 29	14.95
Doozil 'A'	12.95

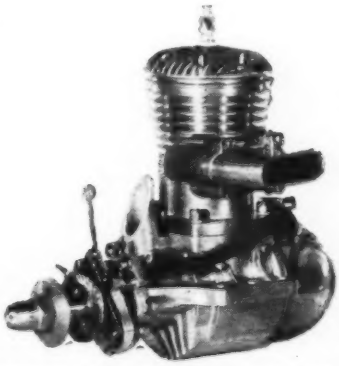
MERCURY MODEL AIRPLANE CO.
920-N5 UTICA AVE. • • • BROOKLYN 3, N. Y.

SEND 3c STAMP FOR CATALOG & FREE "Motor Hints Chart"

ANDERSON SPITFIRE

"The Engine Experience Built"

NOW READY FOR DELIVERY AT YOUR DEALERS!



A LOT OF ENGINE FOR $24.95

Less Coil and Condenser (Includes plastic gas tank for free flight)

SPITFIRE SPECIFICATIONS

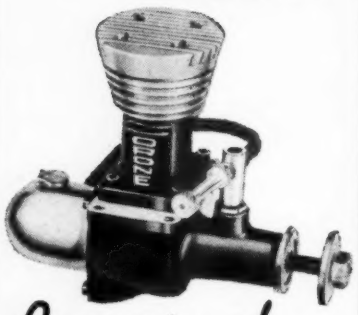
TYPE—Two port, two stroke cycle, air cooled.
FUEL ADMISSION—Through ball bearing mounted rotary crankshaft valve.
CARBURETOR—Tangent down-draft. Spray bar suction type.
BORE—15/16". STROKE—7/8". COMPRESSION RATIO—6:1.
PISTON DISPLACEMENT—.604 cu. in. or 10 cubic centimeters.

IMMEDIATE DELIVERY—WIRE—WRITE

MANUFACTURED AND GUARANTEED BY

MEL ANDERSON MFG. CO. 1819 Third Ave. Los Angeles 6, Calif.

Why buy a DRONE ?



Because of

Value $14.95 compared to gas engines at $15.00, plus $5.35 for coil, condenser, wire, plug, booster, switch, etc.

Performance "Drone's" record in '47 was the most outstanding in the engine field, — beating bigger souped up costlier engines in major meets, and winning first in the National Open Stunt Event.

Economy One qt. of "Drone" fuel costing $1.00 operates the "Drone" hours longer when compared to racing fuels and glo fuels, which cost $1.25-$1.50 per qt.

Ruggedness Examination of engine itself will show you why the "Drone" will withstand many more major crashes, than conventional engines.

Reliability Starts easily always. You fly with a "Drone" when others are grounded.

ALL THIS IN "DRONE" for $14.95

HERE IT IS!

The SECRET WEAPON

TOPS IN STUNT DESIGN

Predicted to be the best design and kit of '48, Leon Shulman's "Secret Weapon" will be a history making record breaker.

Accumulative years of design experience, plus many new innovations in structural and aerodynamic design, makes the "Secret Weapon" THE Stunt Model.

Capable of doing every possible maneuver that control models can perform, the "Secret Weapon" will do what other models can't, — from a loop to vertical 8's.

Complete kit contains:

Shaped and hollowed leading edges, tapered trailing edges, and EVERY component piece pre-cut and shaped. Available at all leading dealers now,

$3.95

"Drone Prop" now available, 35c

The perfect prop for STUNT flying. Mail orders add 25c.

DRONE ENGINEERING INC
1163 EAST BROAD STREET
ELIZABETH, NEW JERSEY

with a starter this fuel may be used to good advantage, but its general usage is not advised due to its disturbing nature.

Next we tried adding our diesel truck fuel to regular *Drone Diesel* fuel. This worked very well in quantities up to about 25% truck fuel. It did show an appreciable drop in power when any concentration over this amount was used. This trick may be used to extend most any diesel fuel. The percentage of addition for your engine will have to be found by trial and error. This will not improve engine performance, but it cuts fuel costs.

Our complete run of experiments is too numerous to detail; however, at no time did we find a better mixture than the standard three to one (ether and oil) fuel, from a power standpoint . . . until we tried our final experiment, based on a formula supplied by a diesel fuel chemist who wishes to remain anonymous. His formula worked at once, and exhibited not only improved performance but it is also a possible base from which to develop a whole new line of fuel.

The formula is rather intricate and requires the use of one chemical which is rather difficult to obtain. It can however be secured from the Eastman Kodak Co. in Rochester, N.Y. It can be either of two compounds: ethyl nitrate, or amyl nitrate. The *a* in the nitrate is very important, as either amyl nitrite or ethyl nitrite will not do the job as well. The concoction is:

20% SAE 20 motor oil (this must be a wax free type)
20% Diethylene glycol monobutyl ether
40% Diesel truck fuel (light grade)
20% Ether

To this mixture add 2%, *no more*, of ethyl or amyl nitrate.

The oil is of course obtained at any neighborhood gas station. The glycol ether can be gotten at any chemical supply house. The diesel truck fuel is obtained at any service station catering to trucks of the diesel type. The ether is our old friend from other fuels.

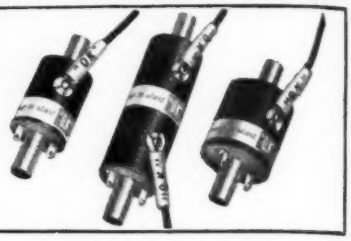
You will note that only 20% of this fuel is our old standby ethyl oxide, or the good old "put you to sleep" type of ether. This fuel will work without the 2% additive ingredient, but for super-power you'll need it. This fuel is easy starting in cold weather, is just about knock-free, (an engine will stop before it will knock) it is insensitive to needle valve adjustment, and supplies a great amount of power.

At present I am conducting experiments based on the use of special diesel fuel additives which are used in actual diesel engines to improve performance. If any of these tests should prove fruitful we will make the formulas known so that all can enjoy even more the smooth performance of our ignitionless diesel engines.

The fuels mentioned in this article can be made applicable to any model diesel. For fixed compression types it will be necessary to experiment with the oil content to achieve best operation. For any variable compression engine the fuel may be used as given, the necessary variation for different engines being taken care of by the adjustable compression feature.

Tests made using the *Drone* engine were with a fixed compression head, while tests with the *Micro-Diesel* made use of the variable compression feature. The author feels that even better results can be obtained in the case of the *Drone* by using a VC head. It is also interesting to note that further experiments with the *Drone variable compression head* (MODEL AIRPLANE NEWS January 1948) fully bear out our claims of operation on varied fuels, the *Drone* performing excellently on *Micro* and other type fuels.

"O. K." HIGH-VOLTAGE COILS



FASTER STARTS LONGER BATTERY LIFE

"O. K." High-Voltage Coils bring proven better performance to any miniature ignition type engine. Flight check starts and laboratory tests reveal they contribute positively to easier, faster starting and longer battery life. Pack a load of reserve power that pays off on the flight line. Made only of the finest materials, they have a clean, perfect finish with lifetime sealed end coverings. Every coil is tested and guaranteed. Sold complete with necessary high tension leads.

Coil A for A and B class engines.....$2.50
Super-Coil C for B and C class engines.....$2.50
Twin Coil for two-cylinder engines.....$5.00

MATCHED CONDENSERS

Strength and freshness assured as they are hermetically sealed in moisture-proof Bakelite cases.

200V for single cylinder engines.....25c
400V for two-cylinder engines.....35c

SOLD BY LEADING DEALERS

HERKIMER TOOL & MODEL WORKS, Inc.
Herkimer, New York

Expansion Engines

Widely used some years ago, expansion engines are now becoming increasingly popular. Whereas present interest centers around CO-2 power plants, steam and compressed air have been employed most widely in the past. R. L. Clough, Jr., in an article in June M. A. N. describes some of his experiences with engines of all these types.

MOD-KRAFF has the LEADING LINES.....

Write for Prices and Discounts on Your Letterhead. No Retail Mail Orders Accepted.

MOD KRAFF CO
840 Union St., New Orleans 12, La.

Build Your Own Diesel

(*Continued from page* 19)

wide, and 1-1/4" square on top. Loosen two jaws of the chuck and remount the block, bottom face toward chuck which when tightened should bring the top surface in exact alignment ready for boring. Check again carefully, running the lathe to see that the top face and center mark you previously made do not wobble. Drill in progressive stages, finishing with a boring bar. Remove from chuck and scribe the by-pass slot. Carefully file by-pass slot straight down and file connecting rod clearance on the other side. Work to the dimensions specified; if more clearance is needed later when motor parts are fitted they may be filed a bit further.

Drill and tap the holes for cylinder and crankcase cover mounting, using white-lead for a lubricant.

CRANKCASE COVER—Cut a piece of aluminum 1-1/4" square to a length of about 2-1/2". Locate its exact center by scribing across the corners of the 1-1/4" square ends, and center punch. Center drill on drill press and mount on the lathe centers as you did the crankcase block, using the four-jaw chuck to hold it as well as drive it. Bore to size, first using a drill then finishing with boring bar.

Loosen two jaws of the chuck and remove the work; remove the center and reverse the work, then bring the tailstock center up to the work for added support. Tighten chuck and check for trueness. Turn outside diameter to 1-3/32" plus a few thousandths. Cut off to length allowing plenty of tool clearance to prevent chatter. Face the work to exact dimensions.

The cover must fit tightly into the crankcase bore. Without removing from chuck, try the piece for fit, then if needed turn off a thousandth or so. Since this is a finishing cut, run the lathe at high speed to obtain a very smooth surface. Do not remove the work from the lathe until desired fit is obtained. Drill mounting holes last.

It is necessary to reason out each step before proceeding; lack of reasoning may mean a mistake and make it necessary to remake a part. As we proceed in construction, then, remember that each part must be *fitted* to adjoining parts by a cut and try method. Only then can we obtain a good enough fit to give long life and good performance to an engine.

FUEL TANK—Turn a bar of aluminum to 1" O.D. Your fuel tank may be of any desired length. Bore with successively larger drills and finish with boring bar. Check O.D. for fit into rear cover plate; turn down until a very tight fit is obtained. Cut off to length desired. Drill for fuel line and for the Gits fitting that serves as a filler cap. Press in Gits cap.

CYLINDER HEAD (Aluminum)—Turn and finish; scribe the circle for the mounting holes. While the head is still chucked, center drill, then run through a tap drill and hand tap compression screw hole; center the tap on the tail center and pull the chuck around by hand to do this job. Remove from chuck and drill mounting holes; take off burrs by lightly turning a larger drill by hand on top and bottom of the holes.

The most difficult parts should be made last so that the skill you have acquired can be exercised on them. Work even more cautiously than before when tackling the next piece.

CYLINDER—Select a piece of cold rolled steel bar 1-9/16" in diameter and 4"

Four Star Model Builders SUPPLY

MOTORS

Hornet 60A	$22.75
Anderson Spitfire	24.95
McCoy Sportsman Jr.	14.95
McCoy Sportsman Sr.	16.95
Atwood Champ, JH	17.50
Bantam .199	16.50
Bullet "100"	9.95
Dooling 61	35.00
Drone Diesel	14.95
DeLong 30	15.50
Torpedo, K & B	16.50
O.K. CO_2	4.95
Glow Plugs	.85

Immediate Delivery

McCoy 49	$25.00
McCoy 60 New	27.50
Forster 29 or 305	14.85
Madewell 49	12.50
Ohlsson 19	9.95
Ohlsson 23	9.95
Ohlsson 60	11.95
McCoy 29	19.50
Super Cyclone Dual	19.95
Super Cyclone	18.95
Sky Devil	21.00
Dynajet Std.	24.50
Dynajet, Red Head	35.00
Minijet	21.00

CONTROL LINE KITS

Snorky	$ 2.25
Bantam Special	2.75
Sharkadet	3.95
Shark G 5	4.95
Super Zilch	4.95
Lil Zilch	2.95
Berkley Bug	2.95
Berkley Bat	4.95
Berkley P-51	7.95
Zing	4.95
Whirlwind Jr.	2.95
Whirlwind	7.95
P.D.Q.	5.00
P.D.Q. Senior	7.50
Orbit	6.95
Perky	2.00
Tyro	3.50
Compstitor	5.50
Trainee	3.95
Atomic	$ 3.50
Demco Speedwagon	4.95
Bipe	3.95
Demco Special	7.95
Trail Blazer	2.95
Tarpon	10.75
Berkely P-47	5.95
Topping Alum.	10.00
Buzz	8.95
Beechcraft D17	9.95
Piper Skycycle	7.50
Comet Whizzer	9.95
Super Fireball	7.50
Knight Twister	7.75
Bearcat F8F	6.95
Ryan FRI	8.00
Fokker D-7	7.50
Meteor	7.50
Capitol "400"	4.95

GLIDERS

H.L.		T.L.	
Thermie 18	$0.20	Thermie 30	$0.50
Thermie 20	0.35	Trooper	0.65
Thermie Trio	0.35	Thermie C	0.80
Thermie 100	7.50	Thermie 50	1.00
Streaky	0.35	Sailwing	1.00
Skylark	0.50	Thermie 50X	1.50
Sinbad Sailer	1.25	Floater	2.00
Super Sinbad	2.50	Thermie 70	3.50
Cosmo	1.25	Thermie 72	3.50
Thermal Ace	0.25	Eaglet	0.50
Tiger Moth	0.25	Condor	1.00
Megow Z-3	0.50	Albatross	4.00

SUPPLIES

BALSA WOOD Best Quality—36" lengths

STRIPS

1/16 sq.	½c	1/4 sq.	3½c
1/16x1/8	1c	1/4x3/8	4c
1/16x3/16	1½c	1/4x1/2	6c
1/16x1/4	2c	1/4x5/8	7c
1/16x3/8	2½c	1/4x3/4	8c
1/16x1/2	3c	5/16 sq.	5c
3/32 sq. 3 for	4c	3/8 sq.	6c
3/32x3/16	2c	3/8x1/2	8c
3/32x1/4	2½c	1/2 sq.	9c
3/32x3/8	3c	3/4 sq.	15c
3/32x1/2	3½c		
1/8 sq. 3 for	5c		
1/8x1/4	2½c		
1/8x3/8	3½c		
1/8x1/2	4c		
5/32 sq.	11½c		
3/16 sq.	2c		
3/16x1/4	3c		
3/16x3/8	4c		
3/16x1/2	5c		

SHEETS

1/64x2	8c
1/32x2	8c
1/20x2	8c
1/16x2	8c
3/32x2	10c
1/8x2	10c
5/32x2	12c
3/16x2	14c
1/4x2	16c
5/16x2	18c
3/8x2	20c
1/2x2	22c
1/32x3	10c
1/16x3	12c
3/32x3	15c
1/8x3	19c
3/16x3	22c
1/4x3	25c
3/8x3	30c
1/2x3	35c

PLANKS

1x3	$ .50
1x6	.90
2x2	.60
2x4	1.20
2x6	1.80
3x3	1.50
3x6	2.70
4x4	2.50
4x6	3.70

Beveled balsa trailing edges, 36" lengths

3/32x3/8	3c	5/32x5/8	5c	7/32x3/8	7c
1/8x1/2	4c	3/16x3/4	6c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16	6c	1-3/4	18c
10x1x1-1/2	10c	Glider Wing Section	
12x1x1-1/2	12c	16x1-1/2x2	26c
14x1-3/16x			
18x1-3/4x2	32c
9x1-1/2x2	15c
10x2x2-1/4	25c
3x3/16x20	18c

CLEAR DOPE THINNER, OR CEMENT 1 oz. 10c, 2 oz. 20c, 4 oz. 35c, ½ pt. 50c, pt. 70c, qt. $1.00, gal. $3.50.

COLORS 1 oz. 10c, 2 oz. 20c, 4 oz. 40c, ½ pt. 65c, pt. 95c, qt. $1.75, gal. $5.00. Red, Orange, Yellow, Green, Lt. Blue, Dk. Blue, Black, White, Brown, Olive Drab, Silver, Battleship Gray. Woodfiller.

WATCH THIS SPACE FOR NEW ITEMS

Ohlsson 23, Rotary Valve Model	$10.95
Ohlsson 23, Glow Engine Kit	8.95
Mite Diesel	12.95

NEW CONTROL LINE KITS

Trixter Invert	$ 5.95
Hawker Super Fury	2.50
Super Cinch	2.95
Buster	2.50
Secret Weapon	3.95
Super Solution	2.25
Demco Super Bipe	$4.95
Nifty, by Goldberg	4.95
Stunt Ace	3.50
Monocoupe	4.95
Times Flies	1.95
Wedell Williams	1.95
Howard "Ike"	2.95

NEW GADGETS

Vibra-Tak	$ 2.00
A-C Glue Gun	.75
Mart-Lee Muffler, class C	3.75
Thimble Drome Racer with Herkimer CO_2 engine, ready to run	12.75
Thimble Drome Racer only	3.95
Ohlsson 23 conversion Kit for TD. Racer	7.50
Balco Ignition Unit	1.75
CO_2 Capsules 10c each, 12 for	1.00
M-L Jr. Muffler, A or B	2.95
Hotshot Jet Racer	.60
Monojet	.85
Midjet	.85

FREE FLIGHT KITS

Korda's Powerhouse B	$4.95
Brigadier 38	1.95
Brigadier 58	2.95
American Ace 54	3.95
Bucc. B Special	3.95
Musketeer Std.	4.95
Cavalier 60	6.95
Bucc. C Special	6.95
Super Buccaneer	9.75
Custom Cavalier	17.50
Zipper A	1.95
Interceptor, Comet	3.95
Zipper	5.95
Sailplane	8.95
Baby Playboy	1.00
Playboy Jr.	3.25
Playboy Sr.	6.00
Stinson Reliant	17.50
Piper Cub A	1.95
Flamingo	9.95
Piper S Cruiser	10.95
Roamer	2.95
Aeronca Champ	$4.95
Pacer B	3.95
Pacer C	4.95
Airfoiler	3.95
Jiffy	1.95
Bee	1.95
Brooklyn Dodger	3.95
Super Yogi	3.95
Vagabond	5.50
Aero Champ	2.50
Ranger	3.00
Zomby	3.00
W O G	5.50
Piper Cub, Megow	6.95
Banshee	6.95
Super Quaker	8.00
Mercury Jr.	3.95
Good News	3.95
Larkey	3.50
Mercury	5.50
Westerner C	5.95
Westerner A	3.50
Westerner B	4.50
Zoomer	6.95

Rubber Power Models

Jasco Special, "C"	$1.50
Interstate Cadet	1.50
Cessna 140	1.50
Stinson Voyager	1.50
Culver V	1.50
Gollywock	1.25
Dyna Moe	1.50
Jabberwock	1.50
Circle King	1.00
Thermalier	1.00
Folkerts Racer	$1.50
CO_2 Powerhouse	1.50
Megow CO_2 Special	1.50
Luscombe Silvaire	1.00
P-80 Shooting Star	1.00
Flying Cloud	1.50
Monogram Prowler	1.25
Comet Gull	1.25
Monogram Pirate	1.25
Lancer, CO_2	1.00

(Free Rubber with Each Kit)

PURE GUM RUBBER	1/8" flat, 1c per ft., skein	50c
	3/16" flat, 1½c ft., skein	50c

ACCESSORIES

Aero Coil, Lt. Wt.	$2.50
Quality	3.00
Modelectric coil	2.25
Competitor Coil	1.95
Herkimer Coil	2.50
Aero Metal Cond.	0.35
H.T. Leads	0.15
Ignition Wire, ft.	0.02
Soldering Lugs	6/5c
Fahnstock Clips	2/5c
Toggle Switch	50c
Slide Switch	30c
Tip Jacks, Set	60c
Pee Wee Clips, ea.	10c
Alligator Clips, ea.	10c
Spark Plugs, V, V2, V3, VR1, VR2, ea.	50c
Austin Timer	1.50
Arden Timer	2.50
Battery Box, Lg., Med., Sm.	0.40
Mounting Bolts	4/10c
1/8 I D Washer	6/5c
1/8 Lock Washer	6/5c
Alum. Mounts, Sm.	35c
Lg.	55c
Flexible Needle Valve	1.25
Neoprene Tubing, Ft.	25c
Maeco Wedge Tank	1.00
Metal Tank, 1¾" or 2" Horz. or Vert.	1.00
Aero Ignition Pack	3.75
Aero Ready Mount	75c
Aero Racing Cond.	60c
Fuel Shutoff Valve	1.00
CO_2 Jet Gun	.35
Bellcrank	25c
Walker U Reely Cont.	7.50
Walker Remote Con.	12.50
Flightline Reel	1.25
Sullivan Reel & Hdl.	1.25
Music Wire, 3 Ft. 020 & 030, 3c; 035 & 040, 4c; 1/16, 5c; 3/32, 10c; & 1/8, 15c	
Tissue, All Colors	5c
Silkspan, 00	5c
Silkspan GM	10c, 3/25c
Bamboo Paper, Red, Yellow, Blue, Green, White	10c
Balsa Props, 4"-4c, 5"-5c, 6"-6c, 8"-8c, 10"-10c, 12"-12c, 14"-16c	
Prop Shafts, Sm.	6/5c
Aero-Trol Radio Control Unit	$49.50
Good Bros. Radio Control Unit	59.50
Bite-Pitch Props, 8 to 11 dia.	$0.50
12 to 14 dia.	.60
(specify pitch, 6", 8", 10", 12")	
Flotorque CO_2 Special	.15
Flotorque Champion, 8", 9", 10" dia.	
10", 12" or 14" pitch	5 for 1.00
Austin 4 Socket Wrench	.50
Wright Test Block, Std.	4.95
Wright Test Block, Deluxe	9.50
Electromite Coil, 2/3 oz.	1.95
Super Duper, gas-oil mix fuel, pt.	.35
Glow fuel, gas-oil mix, pt.	.75
Glow fuel, alcohol-castor, pt.	1.00
Power Mist No. 6, qt.	1.50
Power Mist Silver Label, qt.	1.50
Blue Blazer, qt.	1.00
Control Wire, 100'	65c
010, 012, 014, and 016, 140	75c
Flexible Leads	25c
Airlite Wheels 2¼"	1.00
Aero Metal Wheels	
2½" per pair	2.15
3½" per pair	2.50
4½" per pair	2.75
Sponge wheels, Alum. hubs, 1⅞" per pr.	50c;
2¾" pr.	60c.
Maco Sponge Tail Wheels.	
Alum. Hub ⅞"	ea. 10c
1¾"	ea. 15c
Hely Arc 1½"	ea. 45c
2" 50c; 2½"	ea. 75c
Plastic Spinner	69c

Gas Propellers

Diameter	6" or 8" Pitch	10" Pitch
8" or 9"	35c	45c
10"	40c	45c
11"	40c	50c
12" or 13"	45c	60c
14"	50c	65c

Plywood 1/16x6x12	35c
1/16x6x12	35c
3/32x6x12	35c
¼x6x12	35c
Tubes Cement, Sm.	5c
Lg.	10c
Birch Dowels, 3"	
1/8, 3/16, & 1/4" ea.	5c
Scotch Insulating Tape, Roll	25c
Washers ⅛" doz.	5c
¼"	7c
Ball Bearing, Sm.	10c
Lg.	10c
Plastic Wheels, ⅝" 4c pr., ⅞" 5c pr., 1¼" 7c pr.	
Birch Wheels, 1" 5c pr.	
Balsa Wheels, 1½" 20c pr.	
Alum. Tubing, ⅛" OD, 1/16 OD, 3/32 OD 15c ft.	
Ohlsson, O.K., & Bullet Parts in Stock.	
Sterling Test Block	1.50
X-acto 85 Chest	15.00

Please note all fuels will be sent Express Collect.

FREE Postage in U.S.A.

Except Liquids 1 qt. or more, Express Collect

Foreign orders add 15% to total order for packing and postage. No C.O.D. under $1.00. Send for Complete Price List.

ARDEN ENGINES

AT NEW LOW PRICES

.099 P.B. $12.50

.099 B.B. 15.50

.199 B.B. 18.50

Tops for competition in the small classes

FOUR STAR MODEL BUILDERS SUPPLY

116 STATE STREET • SCHENECTADY 5, N.Y.

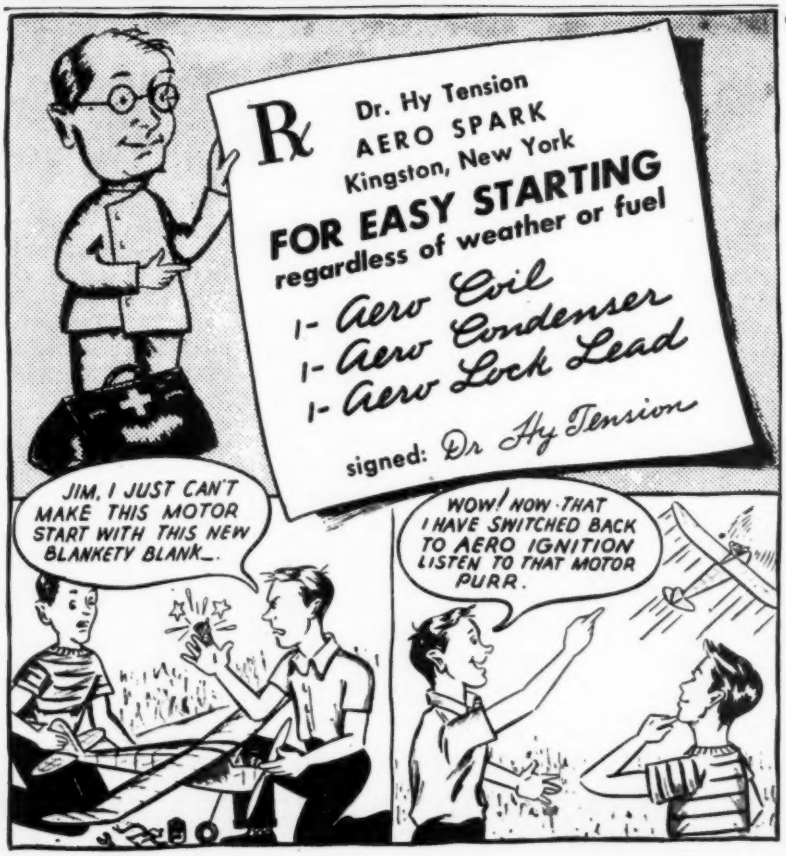
all model engines like TIGER products!

Whether you use your engine for flying, racing or any other purpose, give it a chance to perform at its best with TIGER HOBBYCRAFT PRODUCTS . . . fuels . . . controls . . . accessories.

Tiger
HOBBY CRAFT SUPPLY
PER GLO-FUE
Use With Glo Plugs
Tiger Super Glo-Fuels A and B, and Regular. Caster Oil. S.A.E. 70 Motor Oil.
MODEL ENGINE FUELS

Get them at your dealer today! Super Glo-Fuel A, pints 75c; B, pints $1.00. Regular, pints 35c, quarts 60c. For your own fuel mixture—Caster Oil, 4 oz., 45c —SAE 70 Motor Oil, 8 oz., 25c. Tiger Fuel Pump, a money-saving convenience for every engine owner, 69c. Tiger precision milled and machined universal needle valves, rigid and flexible and new de-luxe types with positive ratchet lock, 35c, 50c, 75c. Dealers, please order from your jobber. We prepay freight on jobbers' orders on 100 pound drop shipments.

TIGER PRODUCTS COMPANY - Chicago 90, Ill.


Rx
Dr. Hy Tension
AERO SPARK
Kingston, New York
FOR EASY STARTING
regardless of weather or fuel
1- Aero Coil
1- Aero Condenser
1- Aero Lock Lead
signed: Dr Hy Tension
JIM, I JUST CAN'T MAKE THIS MOTOR START WITH THIS NEW BLANKETY BLANK_.
WOW! NOW THAT I HAVE SWITCHED BACK TO AERO IGNITION LISTEN TO THAT MOTOR PURR.

long. Secure tightly in the three-jaw chuck. Face the end smooth, then center drill this end and bring up tail center for added support. Turn the piece to 1-1/2" O.D.

Mark fin positions with light cuts. Grind a narrow tool with plenty of bottom and side clearance and begin cutting fins, having them somewhat thicker than specified. Check O.D. of cylinder wall constantly with calipers. Make final cuts to bring the fins down to 1/16" thick or less.

Begin the cylinder bore with a 1/4" drill following the larger drills until a 5/8" bore is obtained. Drill slowly with plenty of lubricant. Ream with 21/32" reamer at high speed and slow feed. Cut taper on bottom of cylinder as shown. Cut off to the specified length.

Locate ports and file carefully to size, drilling a few small holes to start. Take care to hold vertical port edges exactly as shown; the sides are not so important.

Turn a lapping bar of any soft metal (copper is very good) and cut several shallow grooves in it with a pointed tool. It should be 21/32" O.D., and it may be necessary to go over it with emery paper to remove burrs caused by cutting the grooves. Leave in the chuck, coat it with fine lapping compound and slip the cylinder over it. Run lathe at low speed in back gear, moving the cylinder back and forth by hand. Do this until the cylinder bore is very smooth. Clean the lapping bar and cylinder thoroughly and apply oil and rouge. Repeat the lapping process until a glass smooth bore is obtained.

Drill base mounting holes on cylinder. Drill and tap cylinder head mounting holes. Coat cylinder well with oil to prevent rust before other parts are finished.

COMPRESSION SCREW—Turn an ordinary 10-32 flathead steel screw to a very small round head and round the bottom as shown on drawings. Solder a piece of music wire in the slot to act as a lever,

Part 2, to be printed in the next issue, will describe the building of the remaining parts of your diesel motor, and final assembly. Meanwhile I suggest that if you are not thoroughly satisfied with a part, make it over. The added work is well worthwhile, because one defective part will adversely affect the entire motor, and may prevent successful operation.

dmeco's **SUPER BIPE**
IS HERE, BY POPULAR DEMAND!

SPECIFICATIONS
WING SPAN 28"
WING AREA 278 sq. in.
LENGTH 24"
WEIGHT 2 lb. max.
At Your Dealer ONLY..... **$4.95**

THE SUPER BIPE IS—
A superior 100% stunt model of compact size!
Design-Engineered to have superior stunt-ability in inverted flight!
Powered with any engine .30 to .60 disp. using Diesel, Glow Plug or Ignition!

DE BOLT MODEL ENGINEERING CO.
WILLIAMSVILLE 21, N.Y.

ANNOUNCING

THE RACE CAR HIT OF THE CENTURY!

All in One . . . Ready to Run

Nothing More than Fuel Needed

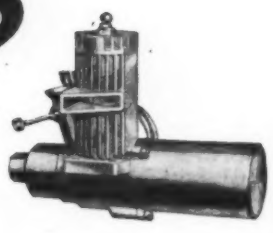
COMPLETE IN ITSELF, MOTOR . . . GEAR DRIVE . . . HI-SPEED WHEELS, TIRES . . . AND HOT PLUG

and LOOK! Retails for only **$19.95 !**

THE MOST OUTSTANDING RACE CAR VALUE EVER OFFERED!

The new Thimbledrome "CHAMPION '15"—Model 303C-15. Factory built, bench assembled and tested —Ready for fun.

An X-Ray view of your new "THIMBLEDROME" showing compact new power plant, housed gear drive, hi-speed wheels and front-end axle unit.



Here's your No. 515 engine, complete with hot plug.

And here's your No. 501 geared drive unit.

At last you can take your sleek new "THIMBLEDROME '15" out of the box, gas 'er up and off you go. Simple as that. Nothing to build, nothing more to buy. Here at last is the answer to a world of demand for a popular-priced, factory-built race car, ready to go right now and loaded with quality. Your easy starting "THIMBLEDROME '15" will give you dependable, long life performance at speeds from 15 to 70 M.P.H.

FEATURES: Shatter-proof construction, assorted colors and numbers. Two-port, 2 cycle power plant. Weight 4-oz. Carefully engineered and balanced for long life at high speed operation. Fuel easily obtainable anywhere, safe to handle. Hot plug ignition. Patents applied for. Individually boxed. Full instructions included.

L. M. COX MFG. CO.

3757 Wilshire Blvd., Los Angeles 5, Calif.
FAirfax 2301

NOTE: Motors, gear drives, drive wheels and front-end units are available separately if desired. Individual retail prices on request.

NOW!! --- NEW!!

The ATWOOD "GLO-DEVIL"

Specifically Designed & Engineered for Glo-Type Ignition

$15.00 (LESS IGNITION PLUG)

.60 Displacement
AMA Class D
For Control Line & Free Flight
No Ignition Coil, Condenser, Breaker Points or Flight Batteries!! Save Money!! Save Weight!! Improve Performance !!

Ask Your Dealer for a demonstration.

AND—If you want to convert it to conventional breaker-point ignition simply add timer accessory.

For Those Who Demand The Ultimate In Conventional Ignition Engines

The ATWOOD "SUPER CHAMPION"

$17.50 *at your dealers*

The National Stunt Champion

All Atwood Engines are Fully Tested and Fully Guaranteed

ATWOOD MANUFACTURING CO., 147 Pasadena Ave., So. Pasadena, Calif.

PRE-SHAPED!

The Hard Work Is All Done in These BUTCH and PACIFIC BI-LINE Precision-Assembly Kits.

Take the wing silhouetted above. Note the shape. That's just how it comes in "Butch" and "Pacific Bi-Line" kits! Leading edge rounded to sanding distance—airfoil and trailing edge ready-formed—wing-tip rounded. The whole thing comes cut within about 1/32" sanding distance. AND the wing is slotted for dihedral wing joint. No fussing with longerons or ribs or tissue. The wings are all-balsa. Same way with the rest of the kit. Every part, every piece, is ready for sanding . . . except the nose-block, and that's left for you to shape for your particular engine.

"PACIFIC BI-LINE"

Biplane (large illustration) for easy assembly, plus stable flight features, plus unusual stunting ability, get the new 24" Pacific Bi-Line. Complete kit

$4.50

- Flies Upside Down
- It Loops
- Figure "8"

PACIFIC ACE "30"

Scoop!

Fly this famous model as a rubber job or with O-K's new CO_2 engine. Complete instructions and full size installation instructions in every kit. If your dealer can't supply you with an O-K CO_2, write direct to Modelcraft. Pacific Ace is the world's most flight-tested model. Over a million sold. All-balsa kit, full size plans, 30" wingspan. Flies like a $2.00 job.

50c

(Plus .15c Postage)

"BUTCH" U-Control Trainer

Here's a U-Control Trainer that's tough as its name, exceptionally easy to put together. All-balsa, no paper. 28" wingspan. Proved Modelcraft performance. Full size diagrammatic plans with "Butch" insignia.

$3.65

MODELCRAFT "FLYING MODELS THAT REALLY FLY" 11929 SOUTH WESTERN AVE., LOS ANGELES 44, CALIF.

Air Ways

(*Continued from page* 30)

we urge readers to heed such commonsense suggestions at all times!

CERTIFIED TIMERS. We have heard many complaints that the timers for this or that contest didn't know their job, and so some deserving modeler was done out of a place he should have had. After every such episode it is suggested that some system be set up by which experienced timers could be so certified, and individuals without the all-important experience, however well-meaning they may be, will not be the reason why some future Joe Doakes was done out of a well deserved record.

We now hear from June Dyer, well known West Coast model enthusiast, that such an arrangement is an accomplished fact. A small card will be given each individual which certifies that he has qualified "as to ability, honesty, eyesight and experience" for service as a judge or timer. Six indorsements may be made on this card, covering gas power, rubber power, glider, and indoor models in free flight, and speed and precision in U-control.

The cards were printed by the *Los Angeles Aeromodelers* and will be distributed and signed by the *California Association of Model Clubs.*

We feel this idea will spread, and if it proves as satisfactory as it must if administered fairly, these cards will become an important part of the equipment for experienced fliers.

ENCOURAGEMENT FOR MODELERS of power driven planes, cars and boats in Los Angeles was given with the formation of a municipal model hobby committee under sponsorship of the Los Angeles City Recreation and Park Dept. Representatives of the Department met with members of local model clubs to work out current problems in operation of model craft at recreation centers.

The two biggest problems confronting the plane fliers are: noise of the engines and danger to spectators from high speed models. The committee made noise measurements of models in operation to ascertain the intensity of the sound with and without mufflers and at various distances. After exhaustive tests it was found that the mufflers removed objectionable high frequency components of exhaust noise, and resulted in a satisfactory reduction in the overall sound.

To settle the safety angle, the following means were found most practical:

1. Establish tensile strength figures for cables and require pre-flight tests.
2. Permit flying in areas already fenced.
3. Install guard fences at one or more adaptable locations.
4. Enlist cooperation of all modelers in preventing accidents.

As a result of the new committee's activity, operation of powered models will be encouraged and promoted in the L.A. area. Safety rules have been set up, motors without mufflers will be prohibited, letters are being sent to manufacturers urging them to develop mufflers, and descriptions of homemade mufflers will be distributed to model clubs.

It is thought that this is the first such committee in the country, and its success is proven by the fact that the City Recreation Dept. will provide areas for day and night operation of planes, cars, and boats.

RADIO CONTROL. On page 36 of our April 1948 issue we presented the latest data available on radio control license developments. A copy of this article was

The Monocoupe
BY STERLING

$4.95 BY MAIL Add 30c

CUSTOM SPUN ALUMINUM COWL
- Carved Leading and Trailing Edges
- Clean Die Cut Ribs, Bulkheads, Tail Surfaces, Etc
- Hardware Kit • Full Decal Sheet • Formed Wire Landing Gear • Step by Step Instructions.

Steals the Show — Wherever You Go

A natural for that beauty event. Ideal for sport and stunt-flying. Contruction time: 4 evenings.

A 36" SCALE CONTROL LINE MODEL
For any B or C Engine
Sterling Engine Test Block....$1.50 BY MAIL
NOW AT YOUR DEALER Add 15c

DISTRIBUTORS! DEALERS! CONTACT US AT ONCE FOR FULL INFORMATION. Write or Wire Today to Sterling Models, 4612 C St., Phila. 20, Pa.

LANSCO
Model Airplane Merchandise at Standard Prices
OWNED and OPERATED by an ACTIVE MODEL BUILDER
Mail Order Service — 36 Years Same Location

6 2-OZ. BOTTLES CEMENT $1.10 postpaid

MOTORS

Arden Glow Plug	$ .85
Glow Plug Adaptor	.25
Arden .099 Pl'n Br.	12.50
Arden .099 Ball Br.	15.50
Arden .199 Ball Br.	18.50
McCoy "29"	19.50
McCoy "49"	25.00
McCoy "60"	27.50
Forster "29"	14.85
Super-Cyclone	18.95
Ohlsson "19" & "23"	9.95
Ohlsson "60"	11.95
O.K. "Hothead"	12.50
Atwood "Glo-Devil"	15.00
Atwood Superchampion	17.50
OK's CO-2	4.95
K & B "24"	16.50

U-CONTROL KITS

A. J. Fireball	$7.95
Overeasy	4.95
Custom Champ.	2.95
Overeasy Jr.	3.95
Beechcraft "Bonanza"	7.50
"Lil'-Zilch"	2.95
Junior Cruiser Deluxe	5.95
"Super-Zilch"	4.95
California "Skeeter"	3.95
Goldbergs "Zing"	4.95

RUBBER POWERED MODELS

Gollywock	$1.25
Comet Gull	1.25
Jasco "Sport"	1.50
Interstate Cadet	1.50
Flying Cloud	1.50
Stinson L-5	1.50
Bucaneer "30"	1.00

And many others. Write for price list. Motors postpaid and insured in U.S.A. Free postage and packing in U.S.A. Mail orders to—

LANSCO MODEL AIRCRAFT
SOUTH HAVEN, KANSAS

MODEL AIRPLANE NEWS
. . . now in its 19th Year

RUBBER FANS!!
the "CONTENDER"
A NEW CONTEST FUSELAGE MODEL
SPAN 32" LENGTH 27"
MEETS NEW AMA RULES CLASS "C"
$ 1.25
COMPLETE KIT
COMING - THE COMPETITOR
DEL AERO RES. LAB., INC.
617 E. 180 ST. BRONX 57, N.Y.
DISTR.I JOBBERS! WRITE

sent to the Federal Communications Commission so that we could be absolutely sure the statements made therein were accurate. Unfortunately a reply was not received before that issue went to print; we have since heard from the FCC, and they have in general okayed the material but ask us to amplify and reiterate several points. They want us to make it plain that while the FCC regulates the use of radio transmitters, they will not attempt to control the manner in which radio controlled models may be flown.

The Commission feels that the term "license-free band" is misleading, and we should probably call them "code-free bands" since, although a simple license procedure will be required, it is certain that code knowledge will not be called for.

We stated that no individual will be permitted to construct his own transmitter for the two control bands. It appears that this is a bit too stringent, as the FCC states certain qualified individuals may construct and legally use such equipment. However, they point out that the qualified individuals, who may operate non type-approved transmitters, must possess second or first class licenses. It is probable that repairs and tube changes may be made to approved equipment by these same individuals, but this point has not been definitely settled as yet.

Finally, we wish to emphasize that all work toward opening these two bands has been exploratory so far and nothing definite has been settled. Hence, those modelers who wish to become active immediately in radio control should take steps to procure their amateur license so that they can operate under existing regulations. Information on such licenses may be had from any FCC field office or by writing directly to the Commission in Washington.

Picture No. 1 shows June Baker and Bruce Lester (254 Glen Park Ave., Toronto, Canada), winding up the latter's 300 sq. in. rubber powered model prior to a long flight. On this particular day they were getting a 2 flight average of 4:10 on 500 turns. The wing is novel in that it has a tube spar and a specially developed slow-glide section.

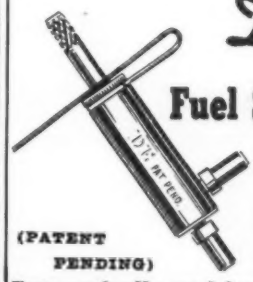
D. W. Mercer (2429 Commonwealth, Charlotte, N.C.) contributed No. 2. This *Cub* was made from a free flight kit and adapted for control line flying. It has a motor cutoff switch and a bomb bay door, both of which are operated by relays that are controlled by a switch and flashlight batteries in the control handle. The bomb bay is used to drop bombs and a parachutist. Mr. Mercer's son, Kent, assisted with the building of this successful flier.

The free flight original in No. 3 was built by Gilbert H. Minnigh (324 Crawford St., Cumberland, Md.), has a 54" wingspan and is powered by a *Bantam* motor. Fuselage and rudder were redesigned to give the plane a more streamlined effect.

Bob Pfeiffer (3670 Bellerive Blvd., St. Louis 16, Mo.) sent in the flying scale *Taylorcraft* L2 shown in No. 4. It was made from plans in May 1943 M.A.N. The glide is very flat, stable and long.

Joseph Mahonchak (123 Linden St., Passaic, N.J.) designed and built the compression ignition engine, called the *Blazer*, shown in No. 5. Preliminary bench tests are promising: the motor revving up 7,000 r.p.m. by tachometer test with a 13-8 prop. Construction is from sand castings, with hand lapped steel cylinder sleeve and meehanite piston. Motor is of the variable compression type and employs

D-E
PRECISION - BUILT ACCESSORIES
NEW!
D-E
Fuel Shut-Off Valve
$1.00
(PATENT PENDING)



Automatically and instantly shuts off fuel on any model engine

It stops your engine, whether it is Diesel, Semi-Diesel (glow plug) or full ignition operated. It stops it the right way — not by flooding the engine but by stopping the flow of fuel.

The only shut-off valve that operates on all engines from .09 to .65 displacement.

Jim Noonan, *Model Airplane New's* Diesel Expert says: *"Explodes previous diesel theory. By my tests, it is fastest, most powerful of 45 diesels from all over the world."*

Variable Compression
D-E Arden
Diesel Conversion

Convert your Arden to an ignitionless Diesel in a few minutes. The D-E Diesel Head gives super power plus easy starting. Complete instructions and information on Diesel Operation are included with each conversion kit.

D-E Diesel Conversion for Arden .099 ..... $3.00
D-E Diesel Conversion for Arden .199 ..... $3.50

OPERATES GLOW-PLUG ENGINES TOO!

D-E DIESEL FUEL
The most powerful diesel fuel available. For use with any variable compression diesel.
Mail Orders: 3 cans $2.50 Shipped Express Collect Dealer Carton: 24 cans
85c Pint

If Your Local Hobby Dealer Does Not Stock D-E Products, Order Direct Giving His Name.

Berkeley Model Supplies—N.Y.
140 Greenpoint Ave.—Brooklyn 22 N.Y.

NOW ONLY $9.95 (REDUCED FROM $15.00)

WITH THESE EXTRAS

Complete with coil, condenser, full instructions, spark plug, tank, aluminum propeller, ignition wire, coil holder, presto starter and copy of 50 page Gas Engine Theory & Practice Book.

Here is your opportunity to buy the 1948 model of the famous G. H. Q. Gasoline Motor. ABSOLUTELY COMPLETE **WITH COIL & CONDENSER, etc.—Every engine assembled by experts, fully bench run and unconditionally guaranteed.**

AN ENGINEERING TRIUMPH

Never Before at So Low a Price!

Indeed an engineering triumph—accomplished by outstanding G. H. Q. designers and engineers, who have constructed into the G. H. Q. motor everything that years of exhaustive scientific aerodynamic research could produce —geared to the highest possible degree of perfection. But more than that, the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G. H. Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance . . . and just imagine —flies model planes from 4 to 10 foot wingspread. AND JUST AS EFFICIENT FOR BOATS, MIDGET CARS AND STATIONARY USE. Easy to start and simple to run.

KIT OF FULLY MACHINED, READY-TO-ASSEMBLE PARTS. ONLY A SCREWDRIVER NEEDED . . . **$4.95** COIL & COND. $1 EXTRA

OVER 100,000 IN USE TODAY!!

FREE Send for free Jumbo catalog of hundreds of model engine, plane, boat, car and hobby items.

SPECIFICATIONS

4 Port 2 Stroke Cycle. ¾" Stroke. 15/16" Bore. 300-7,000 R.P.M. Bearing Surface 1¼" Long. Crankshaft, 5/16" Diam. Rotation, Either Direction. Invertible. 1/5" H.P. Class C under NAA Rules.

SEND ONLY $1.00 or send full amount and we ship prepaid and insured. Shipped Collect C. O. D. Same Day

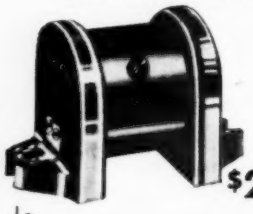
G. H. Q. MOTORS, DEPT. M-58, P. O. BOX 193, STA. O, N.Y. 11, N.Y.

Guaranteed SMITH Ignition

Tuffy

"World's easiest coil on batteries. Has built-in mounting lugs with screws. No soldering! No extras."

Smith Firecracker

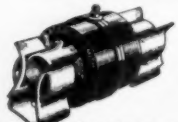


$2.75

Snappy

"Red-hot performance . . . guaranteed satisfactory—replaceable at factory."

Smith Competitor



$1.95

Easy

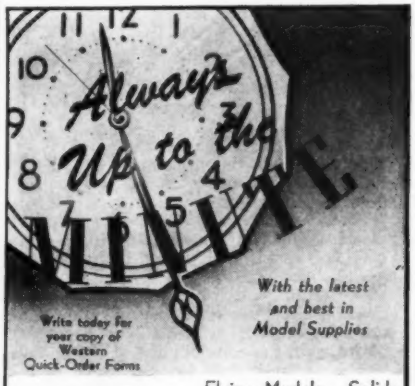
"New fuse-type mounting clips. Anchored central core. Uncond. guaranteed!"

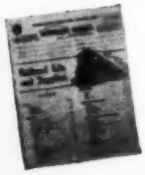
SMITH COILS

105 Pasadena Avenue, South Pasadena, Calif.

IF NOT OBTAINABLE, ORDER DIRECT

FREE: send for 3-COLOR "COILITEER" DECAL





Flying Models - Solids
Engines - Race Cars
Ships - Gas Models
Gliders - Railroad Lines
Materials - Supplies
Nationally Known Brand
Names - Tools - Decals

Western serves the Best to the West. Two convenient locations.

WESTERN MODEL *Distributors*

1576 W. Adams Street, Los Angeles 7, Calif.

1106 Fifth Avenue, Oakland 6, California

crankshaft rotary using a modified commercial needle valve. Total weight of the *Blazer* is 8-1/2 oz. and the height, including compression screw, is 3-1/2 in. The displacement is .295, but ratio between bore and stroke is unconventional as compared to the existing C.I. motors now on the market. Mr. Mahonchak is still experimenting on fuels and props for the engine but hopes to have it ready for the spring contests.

The *Jet* plane in No. 6, built by Walter B. Thomas, Jr. (High Point, N.C.), is powered by a *Dyna-Jet Redhead* engine. Construction is slightly different in that the wing is made from a sheet of magnesium filed to airfoil shape. For takeoff, a single wheel is installed permanently and will allow the plane to take off from almost any terrain. Since there is no torque, the lines hold the plane level until it is airborne. Speeds above 115 mph can easily be obtained on any flight, and due to the metal wing many consistent flights can be made without damaging the plane.

Blaine R. Parkin (2050 Emperor Ave., Apt. No. 54, Temple City, Cal.) constructed the 30" wingspan model in No. 7 and D. P. Wilkinson, a fellow Cal. Tech. student, is responsible for the photo. This parasol monoplane represents the most recent member of an evolutionary series, the purpose of which is to design a stable rubber powered model for sport flying. In addition, spectacular performance has been a quality sought. It was felt that the size range should include models of 24" to 30" wingspans, since these models do not require as much space to fly and are more economical to construct than their larger cousins. Further, simplicity in construction was considered of utmost importance. Since thermal catching was not the aim of these models, emphasis has been placed on obtaining the longest duration motor run which would not too seriously impair the model's stability and gliding qualities. Such a policy has resulted in models of rather high wing loadings, with critical stability problems, but the extra effort spent in solving them has been worthwhile. Mr. Parkin has made calculations on CO-2 tanks and strongly advises against home construction, since most home constructors would probably try soft solder and tin can metal —a dangerous combination for these pressures.

D. W. Evans (1 Oxford St., Weston-S-Mare, Somerset, Eng.) sent in No. 8 to prove that the English are not so far back in the modern trend of control line. The *Jiminy Cricket* reaches a speed of 80 mph and is powered with a 5cc *ETA Diesel*.

The control liner in No. 9 is a *Junior Whirlwind* with floats constructed by Herb Edgar (46 Gill Road, Haddonfield, N.J.). The ship is powered with an *Ohlsson 23*.

No. 10 is an Az-11 *Torenvalk* glider submitted by A. L. Aarts (62 Rollandslaan, Haarlem [Post Overveen], Holland). Wingspan is 79 in., length 44 in., wing area 575 sq. in., weight 24 oz., wingsection Gött. 500, stab. section Gött. 602. The dynamic longitudinal stability is excellent due to the little difference between wing and stab. incidence and a very aft C.G. position (65 to 70% of the chord).

Don Longmire (16831 S. Figueroa St., Gardena, Calif.) submitted the .099 control line pusher shown in No. 11. The plane features a single landing wheel and air scoops; a wedge tank is completely enclosed in the fuselage pod. The wing is the only fabric covered surface. Weight is 6 oz. and span 20".

The 1930 *Laird Solution* shown in No.

FUELS

"POWER MIST"
"SPITFIRE"
"BLUE BLAZER"

New! Powerful Hi Thrust Glow Fuel

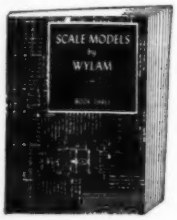
GLOW OR ELECTRIC PLUG
WHERE EXTRA THRUST IS NEEDED

$1.25 PER QT.

Nitrated Methanol and castor oil

FUEL FACTS AND FORMULAS: How to determine the correct fuel. Full information and literature—at your dealer, or send stamped addressed envelope.

FRANCISCO LABORATORIES
3787 Griffith View Drive • Los Angeles 26, California



No modeler's library is complete without the three famous volumes of WYLAM'S Masterplans . . . Real collector's books!

Book 1.....$1.50
Book 2.....$1.50
Book 3.....$2.00

At your dealer's or direct from

AIR AGE INC.
551-5th Av. N.Y.C. 17

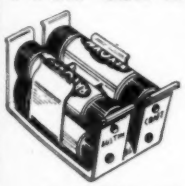
KNOCK-OUTS

at dealers everywhere

Needle Valve

New Flexible-shaft Needle Valve with double acting ratchet and spring for finer tuning and precision adjustment **$1.00**

4 Pen Cell Battery Box



Easiest, handiest way to install and hook up pen cells. Can be balance adjusted from outside of fuselage. Positive contact..... **60c**

A-C Pint Pump

Necessary for proper tank filling! Comes with Blue top—28mm. for flat top cans, and Red top—27mm. for cone shaped cans. Handy, each..... **75c**

SOCKET WRENCH. Protects cylinder fins and plug porcelain. 4 standard size sockets..... **50c**

CO_2 GUN. For puncturing CO_2 tanks. Solid brass **50c**

GLUE GUN. Puts cement in tight corners. Handy, all metal..... **75c**

BOOSTER PLUG-IN. Prevents shorting, eliminates clips. Plate and plug-in..... **30c**

We Pay All Postage

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

AUSTIN-Craft 431 S. Victory Blvd Burbank, California

12 was built by Robert Haack (305 Montrose Ave., San Antonio, Tex.) and is 1/2" to 1' scale, thus having wingspan of a fraction over 10".

NEWS OF MODELERS

Charles W. Fry, Jr. (918 Columbia St., Newport, Ky.) is 19 years old and is a control line and free flight fan. He wishes to correspond with an English boy as he is interested in the development of control line flying in that country. He would also like to hear from someone living in or near his neighborhood.

Louis Zook, aged 13 (RR No. 5, Franklin, Ind.) has a yen for some experience in the sailplane field and is anxious to have a pen pal anywhere in the world who is interested in the sport of modeling.

George Smith ("Fem Croft," Station Rd. Ossett, Yorks, Eng.), would be grateful to have an American correspondent so he could keep in touch with modeling in the U.S.A.

Oscar Eklof (Schantzgatan 2A n.b., Orebro, Sweden) desires to exchange photos and stamps with one of our readers.

Kenneth Burton (L/Ft. 744733, Mess. 20B., 810 Squdr. 17 C.A.G., R.N.A.S. Egliritor, N. Londonderry, N. Ireland), aged 20, is an air mechanic in the Royal Navy and would like to have a pen pal with a view to exchanging plans and drawings of models.

Wayne Spears (706 11th St. North, Texas City, Tex.) wishes to contact someone from the east and west coasts to get some idea as to what the average model fans are doing in those sections.

Ameil Klein (420 Walnut St., Newark 5, N.J.) would like to contact a fellow modeler in Newark or one of the nearby towns who would take on an apprentice. He would be glad to act as a member of the ground crew while learning the ropes.

Raymond Baker (5920 Creswell Rd., Shreveport, La.) is eager to contact a boy about 12 years old who is interested in control line flying.

D. Beagley (Morland 2, Brodie Rd., Chingford, London E 4, England) is interested in obtaining a few Yank gas engines in exchange for some of his small diesels.

HOLCOMB

gives you 24 hour

MAIL ORDER SERVICE

MAIL YOUR FAVORITE MOTOR AIRPLANE KITS and SUPPLIES TODAY!

Add 10% of total order for insurance and safe delivery. Money promptly refunded on unfilled orders. Write for free price lists. Standard prices; fresh merchandise.

HOLCOMB PHARMACY, Inc.
Model Department, Alma, Kansas

Join the AMA Today

The H & H Model Motor

1. Hot Coil Ignition (Patented)
2. High Speed (over 10,000 RPM)
3. Quick and Easy Starting
4. Light Weight (only 8 ounces)
5. Compression Ratio (approx.) 6 to 1
6. Not a diesel
7. Displacement .45 cu. in.

A New Thrill in Flying

Now $18

At your dealers—or order direct

Send 15 cents for booklet which gives complete information, together with plans for a practical simple model plane.

H & H MODEL MOTOR CO.

307 W. MARSHALL STREET • NORRISTOWN, PA.

ART HASSELBACH says:

Here's real news! Just like I predicted. Super Cinch has caught on. Modellers are building more than one Cinch, they like it so much. Try this easy building, sure stunter yourself. You'll enjoy building—and flying it. *But get your order in fast!* Make sure you'll be ready with your Super Cinch!

SUPER CINCH

A CINCH to build . . ONLY 3 HOURS

A CINCH to stunt for anybody

FLIES ON ITS BACK
DIVES . . . LOOPS
CLIMBS AT ANY ANGLE

DESIGNED FOR DIESEL OR GLOW PLUG OPERATION

36" W. Span with proper moment arm . . . 7" Chord . . . Special Airfoil for inverted flying . . . Prefabricated rudder . . . Ribs, Elevator, Stab cut to shape . . . Formed Landing Gear. Complete less wheels and liquids. Free Flying Instructions.

Only **$2.95**

CLUBS! SEND for FREE PRIZE CONTEST KIT ASSORTMENT LIST.

AT YOUR DEALER or Mail $2.95 plus 25c shipping to:

CONSOLIDATED MODEL ENGINEERING CO.
2087 THIRD AVENUE NEW YORK 58, NEW YORK

CLUB NEWS

Arkansas—Colorado—Iowa—Kansas—Missouri—Nebraska—Oklahoma

The combined Mid-States & Kansas State Model Airplane meet, AMA sanctioned, will be held June 5-6 at Smoky Hill Air Force Base near Salina, Kans. The Base will provide housing for participants to stay overnight, and meals will be available in squadron mess halls and the service club.

Sponsors are: the American Legion and Kiwanis Club, both of Salina. The merchants of that town are cooperating by donating prizes besides the usual trophies. In addition to the usual control line events, an extra special feature will be a jet model contest. There will be 20 events in all, and 225 prizes.

Jim McClellan of Wichita, Kans., who did such a marvelous job at the '46 Nationals, will be Contest Director of this 7 state meet.

California

The Downey Modelers Club is having a membership drive. Flights are held every Wednesday night and Sunday morning. Meetings are held at the Downey YMCA on 2nd and 4th Mondays.

* *

The David Lloyd Memorial Trophy is presented each year to a regular member of the *Oakland Cloud Dusters Club* in memory of David Lloyd, the only *Cloud Duster* lost in World War II. Mike Demos won the trophy this year for his untiring work and patience in teaching and helping club members to build indoor models. Last year's winners, Mr. and Mrs. Harvey Robbers, were presented with the permanent David Lloyd Memorial Trophy when they turned the perpetual trophy over to Mike Demos. Carl Rambo won the Robbers Prop Wash Trophy for holding the most club high flight times. Retiring Pres. Robert E. Blau was presented with a beautiful lighter and cigarette case combination suitably engraved with the club insignia, year, and his initials. 1947 Publicity Chairman Myrtle Robbers surprised the members and their guests by displaying a large bound book containing pictures of all 1946 and 1947 flying activities of the *Dusters*, copies of all printed publicity about their activities, and photostatic copies of all A.M.A. National Records they made.

Robbers Prop Wash Trophy High Flight Records for 1947

Outdoor Class

Towline Glider	C	Peterson	7:24.9
Towline Glider	D	M. Demos	14:41.3
Towline Glider	E	Tangney	20:26.6
H. L. Stick	C	D. Robbers	35:53.2
H. L. Stick	D	Andrade	32:04.7
Rog Fuselage	C	Tangney	10:21.3
Rog Fuselage	D	Andrade	13:07.7
Rog Fuselage	E	Andrade	8:41.2
Wakefield		M. Demos	10:30.9
H. L. Glider	B	H. Robbers	7:27.7
H. L. Glider	C	Tangney	8:10.4
Cat. Glider	A	Rambo	3:53.5
Cat. Glider	B	P. Demos	5:07.2
Cat. Glider	D	Rambo	3:38.1
Helicopter		H. Robbers	1:57.4

Indoor Class

H. L. Stick	B	Rambo	17:57.3
H. L. Stick	C	M. Demos	21:20.6
H. L. Stick	D	Rambo	22:09.4
Rog Stick	A	Blau	8:14.0
Rog Stick	B	Rambo	10:19.7
Rog Fuselage	C	Rambo	13:51.8
H. L. Glider	A	Andrade	1:00.4
H. L. Glider	B	Andrade	1:08.0
Helicopter		Tangney	4:42.2

* *

Lakewood Model Association elected the following officers for 1948: Pres. Troy Burris; Vice Pres. Don Newberger; Contest Dir. David McAllister; Sec'y Lew Mahieu; Cor. Cec'y Leta McAllister.

Results of AMA Sanctioned AA Lakewood M.A. 2nd Annual Rubber & Glider Contest held at Long Beach, Feb. 1, 1948:

Combined Classes—Rubber and Stick

1.	Bob Hanford	Open	D Stick	20:10.1
2.	Allen Trainor	Sr.	D Stick	14:59.0
3.	Jim Ryan	Open	Cabin	14:28.0
4.	Oswold Connor	Open	D Stick	14:12.0
5.	Geo. Hondo	Open	D Stick	13:29.7
6.	Bob Dagand	Open	D Cabin	12:50.7
7.	Frank Heilman	Sr.	D Cabin	12:37.0
8.	Leon Morris	Sr.	C Stick	12:23.8
9.	Ralph Conn	Open	D Stick	11:41.0
10.	Bob Moncrief	Open		10:32.9

Combined Classes—Towline Glider

1.	Jack Gilroy	Sr.	E	18:31.8
2.	Ralph Conn	Open	E	14:49.8
3.	Bob Hanford	Open	E	9:32.9
4.	James Adams	Open	D	9:10.7
5.	Gilbert Clark	Sr.		7:38.0
6.	Bob Dagand	Open	D	7:12.8
7.	Wilford Tolman	Sr.	E	5:20.6
8.	Al Lowy	Open	E	4:30.8
9.	Don Gulotta	Sr.	E	4:25.3
10.	J. E. Dillon	Open	D	4:03.0

Wakefield Event—Class D Cabin

1.	Bill Tharp	Open	22:31.2
2.	Dave Converse	Open	17:31.2
3.	Geo. Hondo	Open	15:37.2
4.	D. H. Frolich	Open	7:55.7
5.	Alfred Faulkner	Open	7:37.3
6.	Ben Jackson	Sr.	7:16.0
7.	L. Salisbury	Open	6:18.8
8.	James Tagney	Open	5:54.7
9.	Jim Ryan	Open	5:34.4
10.	Bob Dagand	Open	4:14.6

Combined Classes—H. L. Glider

1.	Bob Hanford	Open	B	7:33.8
2.	Wm. Nickaloff	Open	B	7:28.2
3.	Ed Slobad	Open	B	6:42.3
4.	Bill Atwood	Open	B	6:33.2
5.	Bill Tharp	Open	B	5:44.2
6.	J. E. Dillon	Open	B	5:24.4

RADIO CONTROL
→ for less!

Do you want to control more than one device on your airplane? Modernize your airplane with better *radio control*?

You can convert a *single* control set-up to *three* control. Do away with your old type selector system having a telegraph key and substitute an *automatic* control system. Do away with rubber band escapements and tedious rewinding after each flight.

Construct your own control box and selector and *save half to two-thirds* cost!

Instructions and diagrams for Control Box and Selector $1.00 (p.p. in U.S.)

NAWELL

Box 93 Richmond 1, Virginia

CO-2 Powered Stinson

Scale modelers will be glad to learn that the old master, Earl Stahl, has turned his talents to CO-2 work. In the June issue you will find full details needed to build his beautiful Stinson Voyageur, powered by the OK CO-2 engine.

- Price ½ of similar kits
- Takes any A, B, or C motor
- Fully carved and hollowed all balsa fuselage • Aluminum Tubing
- Solid balsa wing cut to shape
- Solid balsa tail assembly cut to shape
- Cut to shape plywood motor mount
- Ready bent landing gear
- 2 Rubber wheels
- Pilot Control (New Improved Controline)
- Full size plans Fuselage 19" **$3.95** ADD 50c BY MAIL
- Wingspan 21½" Chord 4"

MASTER *Modelcraft*
1074 FRANKLIN AVENUE, NEW YORK 56, N. Y.

Famous BANNER FIREWORKS

OH-BOY! Don't be disappointed. Get the best for your money. Famous Banner Fireworks have all the ZIP, BOOM, BANG you expect of fireworks. This year several new creations have been added. You'll thrill to every last piece in this BIG BARGAIN ASSORTMENT.

BIG SPECIAL DEAL—Only $4.95

Retail value $11.25. Buzz Bombs—Star Shells Block Busters—Zig-Zag Whistles—Flashlight Crackers—Sky Rockets—Roman Candles—Repeating Aerial Bombs, Sparklers and many others. More than 500 pieces. Rush order today. Supply limited. Send money order, bank draft or currency. No C.O.D's. Catalog FREE.

BANNER FIREWORKS MFG. CO., INC., DEPT. 150
346 Capistrano Toledo 12, Ohio

7. Bob Moncrief	Open	B		5:10.2
8. P. Hainer	Sr.	B		5:07.4
9. Don Donahue	Open	B		5:03.2
10. Mel Margison	Open	B		4:56.7

* *

The Junior Museum of San Francisco Recreation Dept. reports the following top flights of 1947:

Micro Division			
Towline Glider	C	Frank Pagano	0:54.0
Towline Glider	D	Jack Ritner	6:36.6
H. L. Stick	A	Carolyn Saumer	0:50.3
H. L. Stick	B	Frank Fordyce	0:44.5
H. L. Pusher	A	Jack Ritner	0:40.4
Junior Division			
Towline Glider	C	Larry Giordanengo	0:48.5
Towline Glider	D	Robert King	2:15.1
Towline Glider	E	Doug Smith	9:10.0
H. L. Stick	A	Eddie May	1:41.2
R. O. G. Stick	A	Jack Ritner	1.11.0
R. O. W. Stick	A	Darrell Larks	0:33.0
H. L. Glider	B	Doug Smith	1:01.1
R. O. G. Cabin	B	Bill Lower	0:46.0
R. O. G. Cabin	C	Einar Enevoldson	1.22.4
Senior Division			
Towline Glider	D	Charles Dorsett	2:36.3
Towline Glider	E	Angelo Lo Castro	1:42.3
H. L. Glider	A	Eddie May	1:12.0
H. L. Stick	A	Doug Smith	1:17.0
R. O. G. Cabin	A	Eddie May	1:47.6
R. O. G. Cabin	C	Angelo Lo Castro	2:49.9
R. O. G. Cabin	D	Charles Dorsett	2:09.0

* *

The Coalinga Calif. Model Club, under free flight contest Coalinga on Sunday, Jan. 11. Here are complete results:

Class A—1. R. Wacker 10:48; 2. F. Mosier 9:58; 3. R. Mosier 8:24.
Class B—1. D. Van Tassel 8:54; 2. J. Menezes 6:20; 3. F. Morgan 5:54.
Class C—1. J. Menezes 14:25; 2. F. Mosier 11:31; 3. J. Crose 9:59.
Juniors—1. F. Mosier 11:31; 2. F. Mosier 9:53; 3. R. Mosier 8:24.

* *

Sec'y Bob McReynolds, of the *Mustangs* compiled the following list of winners of the many events in the *S. F. Mustangs-So. S. F. U Liners* jointly sponsored contest held in So. San Francisco on Jan. 4.

Junior Speed

Class A—1. Lutz 99.7; 2. C. Hallum 97.2; 3. Bob Lane 81.8.
Class B—1. P. Gosch 117.0; 2. C. Hallum 113.2; 3. B. MacKerracher 104.6.
Class C—1. C. Tyer 119.0; 2. P. Gosch 117.5; 3. L. Douglas 107.1.

Senior Speed

Class A—1. Cal Morris 99.7; 2. J. Guggemos 97.2; 3. B. Gunther 94.5.
Class B—1. H. Shiman 118.0; 2. W. Richards 116.13; 3. Bert Rock 111.7.
Class C—1. Huth 127.6; 2. J. Libonati 127.2; 3. E. Moline 120.0.

Junior Precision

Class A—1. E. Stiles 256; J. Pedracci 212; 3. H. McDonough 211.
Class B—1. J. Harvey 87; 2. D. Butman 30; 3. K. Balls 21.
Class C—1. L. Stauto 232; 2. D. Bekins 200; 3. D. Hollfelder 140.

Senior Precision

Class A—1. W. Biscay 133; 2. P. Wallace 117; 3. G. Leanard 110.
Class B—1. A. Simms 266; 2. D. Vis 213; 3. J. Smith 206.
Class C—1. Mayes 319; 2. A. Simms 236; 3. D. Vis 232.

Inside Loop

Jerry Guggemos 5 loops.

Team Event

John Harvey and John Padracci.

Flying Scale

Lester Rosewood, James Smith.

Women Event

1. T. Soloman 100; 2. B. Santina 98; 3. B. Carlson 14.

Connecticut

The Bridgeport Aeronuts will hold their 2nd Annual Conn. State Championships Meet June 20 (rain date June 27) at Beardsley Park, from 7 a.m. to 6 p.m. Prizes will include trophies, merchandise and a possible Helicopter ride.

Florida

Lakeland Model Airplane Club now in process of reorganization will soon be in

WE REFUSE

to be undersold on any engines, planes, race cars, boats, or supplies advertised in this magazine. Gotham's ex-G.I.'s are beating all competition with an

ASTOUNDING OFFER

for the first 5000 requests for Gotham's new price list that will save you money on all quality merchandise, you will get, absolutely

FREE! FREE! FREE!

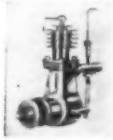
our 176 page fact-packed book, "Model Airplane Engines." Yes, we said 176 pages! A real $1.00 advertised value, absolutely free if you send for a price list NOW!

CLIP THIS AD

and mail to us with name and address. There are no strings or charges of any kind —send no money. You will be delighted with your free gift of the best book on engines and the new money-saving Gotham price list.

GOTHAM HOBBY CORP.
Dept. M, 107 E. 126th St.
New York 35, New York

PACKED WITH POWER!
The New, Sensational Class A
DEEZIL



at the amazingly low price of
$12.95 Less Tank

Gotham proudly presents the world's sweetest and hottest little diesel engine—the DEEZIL "A." We put a solid year of design and development into this engine to give you a diesel that has everything—and now, quantity production gives you in addition the lowest possible price. The DEEZIL is the perfect power plant for planes, boats and race cars.

Its compact, streamlined shape lends itself to easy installation and perfect cowling. Easy starting and steady running to give you 100% flying time. Operation is simple and economical. The DEEZIL is light enough for the tiny jobs yet powerful enough to pull a six-foot freeflighter straight up. And it will run for years and years without attention because it is simple and rugged. Order a DEEZIL today for the thrill of a lifetime.

★ DEEZIL STARTS EASILY
★ DEEZIL IS RUGGED
★ DEEZIL RUNS STEADILY
★ DEEZIL IS POWERFUL
★ DEEZIL IS LOW PRICED
★ DEEZIL IS GUARANTEED

GET your DEEZIL from your favorite hobby shop, or if he is sold out, send only $1.00 to GOTHAM and we'll ship C.O.D. for balance. We pay postage.

DEALERS AND JOBBERS WRITE
GOTHAM HOBBY CORP.
Box 49, Station L
New York 35, New York

Join the JET RACING FUN!

Start Now With Monogram Jet Racer Models

It's the big, new sports craze and more fun than you ever dreamed of with Monogram models. These snappy jet racers have class . . . speed . . . thrills . . . nothing else like them. Get a Monogram kit today. Build your racer complete in an evening. Bodies are shaped and bored for jet cartridge. Other parts fully finished. Steel axles, rubber wheels, plastic shields make realistic speed racers.

TERRA-JET, Kit R-2 $1.00

MONO-JET, Kit R-3 85c

MIDJET, Kit R-4 85c

HOT SHOT, Kit R-1 60c

AT YOUR FAVORITE STORE

If no dealer near you Monogram will have your order filled from nearby retail stock; Add 15c for delivery to price of any model.

Attention: Model Flyers!

Flying days are just ahead. Ask your dealer for Whirlwind and Jr. Whirlwind . . . the super control line gas flyers and the Pirate and Prowler, contest flyers for rubber or CO2 engine power.

MONOGRAM MODELS, INC., 2329 S. MICHIGAN AVENUE, CHICAGO, ILLINOIS

the model aviation field again under a new name and with the backing of the Lakeland Exchange Club.

Plans to promote a federation of model clubs in Polk County are under way. Modelers in any of the towns or cities in this county are requested to write Don. Warner, P.O. Box 1581, Lakeland, Fla., for further information about forming local clubs and joining the new federation.

Georgia

We received the following letter which we feel should be an inspiration to all model clubs: "The *Atlanta Aero Engineers* have started off 1948 with real flying spirit. Officers for the year are James C. Lanford, Pres.; Robert Baker, Vice Pres.; Emily Richardson, Treas.; Louise Monroe, Sec'y.

We have obtained a Hobby Park which we feel is the answer to our model flying problems. Like other flyers we found ourselves being pushed from one field to another. However, with the backing of several groups we successfully worked with our county officials and were recently informed that Fulton County was authorizing us to fly permanently from a special Hobby Park. This park will contain 6 acres and is located where we may fly free-flight or U-Control. We, in Atlanta, feel this is a real victory and that it is definitely going to be the answer to a model builder's dream for a "Model Airport." We wish to advise all model flyers that plans are underway for our Class AAA Southeastern Contest to be held June 12 and 13. Tentative plans are for the contest to be held at the Marietta Army Air Base. Obtain further information by contacting: *Atlanta Aero Engineers*, 604 Peachtree St., N.E., Atlanta."

Illinois

The Aurora Aeronuts held a meeting on Jan. 27 and decided on the following meets to be held in the future: June, 1948, Class A, Club Meet; July 18, Class A Meet, U. control, speed and stunt at their flying field at Phillips Park, Aurora; August, free flight meet. All meets will be A.M.A. sanctioned. Through the efforts of Captain Alden Congrave of the C.A.P., the club now has their own free flight field 3 miles from Aurora. The club is campaigning for new members, so anyone interested may contact Hart G. Betts, 7 Fox Promenade, Aurora for information.

* *

Chicago U Liners are sponsoring a contest to be held at Calumet Park in Chicago on June 13.

* *

Last Dec. 28 the *Gas Model Aeronauts of Chicago* held a one flight high time contest. First place went to a *Forster* powered *Powerhouse* by Charles Klivans; second to Dave Campbell with a *McCoy 60* powered original; third to Norman Skarzynski with a *Bantam* powered *Powerhouse*. This club and the *Chicago Aeronuts* are preparing to run an A.M.A. sanctioned contest on July 18 consisting of free flight rubber, gas, and CO-2. Wallace Simmers, contest director, and members of both clubs will run the meet.

* *

Since the *Groaning Gremlins* were organized in Vandalia, March 1947, they have grown from 11 members to 34. The club attended the contest at Beecher City last August and gained some valuable experience from their participation in it. The merchants in Vandalia are planning to run a similar contest with the

WILLIAM J. DENISON
DUKE CITY MODELEERS
ALBUQUERQUE - NEW MEXICO
FIRST PLACE
SENIOR STUNT COMPETITION
INTERNATIONAL AVIATION CELEBRATION
EL PASO, TEXAS DECEMBER 6-7, 1947

SELECTS FOX .59
FOR HIS ORIGINAL DESIGN AIRPLANE

INSIST ON A FOX HI-TORQUE OR HI-SPEED MOTOR FOR YOUR SHIP AND REALIZE THE THRILL OF A MOTOR THAT WILL NOT SAG, PULL DOWN NOR FALTER NO MATTER WHAT MANEUVERS ARE ATTEMPTED. IT WILL RUN IN ANY POSITION, AS A TRACTOR OR PUSHER AND DEVELOPS FULL POWER ON STANDARD IGNITION OR GLOW PLUG.

ALSO IT IS THE IDEAL POWER PLANT FOR YOUR FREE FLIGHT, CONTROL LINE SCALE, SPEED OR RADIO CONTROL JOB. THE HI-SPEED MOTOR WEIGHS ONLY 9¼ OZ. AND DEVELOPS 1-1/8 H.P. AT 16,000 RPM. THE HI-TORQUE WEIGHS ONLY 9¼ OZ. AND DEVELOPS .92 H.P. AT 12,000 RPM.

BUILD AROUND, FLY AROUND A FOX AND OUTFLY THE REST.

REMEMBER, "THE WORLD'S MOST VERSATILE MOTOR."

SEND FOR FREE LITERATURE

BORE --------- .937
STROKE ------- .860
DISPLACEMENT-- .599

$29.95

AT YOUR FAVORITE HOBBY SHOP
DEALERS ORDER DIRECT

Claude C. Slate Company

1948 SOUTH GRAND AVENUE
LOS ANGELES 7, CALIFORNIA

help of the *Gremlins* this June and are offering close to $1,000 in prize money. The events will be Classes A, B, C and D in speed, stunt and scale.

* *

The Pretzel Gas Model Club has set June 26-27 for their contest date and hope it will not conflict with contests of other clubs as has happened in the past. All mail should be sent to Pres. Wayne Miller, 411 S. Walnut Ave., Freeport.

Iowa

The Waterloo Prop Twisters Club has a membership of over 30 and is one of the most active in Iowa. They conduct work periods twice a week at the Washington Recreation Center and are planning to hold one of the biggest contests in the middle west at Waterloo this summer.

Michigan

Another PLYMOUTH INTERNATIONAL MEET!

PLEASED with the great success of their 1st International Model Plane Contest last year, Plymouth Motor Corp. will again conduct the event at Detroit this summer. This A.M.A.-sanctioned classic will be held Aug. 18-23, and Plymouth will share sponsorship with the Aero Club of Michigan.

This year the number of events will be increased; outstanding additions being those for stunt, scale and jet propelled models.

A new feature this year will be a day of entertainment supplied by Plymouth for the contestants, culminating in the big championship banquet, all on Aug. 23.

The Meet will continue to be invitational, and will be limited to the top 500 fliers from the U. S. and foreign countries. Invitations will be sent to selected winners in A.M.A.-sanctioned contests.

Entry blanks and instruction booklets will be available at all Plymouth dealers after April 20.

The Exchange Clubs of Metropolitan Detroit will sponsor a big annual outdoor contest at Ford Airport June 19 and 20. The contest will be for junior, senior and open, all classes; and tow-line and control flights, all classes. Trophies and awards will be given for all events according to Frank Sposite, contest director. It will be A.M.A. sanctioned and conducted by the Department of Parks and Recreation, the Michigan Wing of Civil Air Patrol, and the Michigan Hobby Clubs. For further information phone Mr. Sposite, VA 2-1590.

Missouri

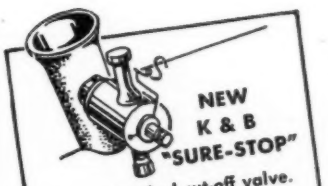
On April 4, the *Ski-Hi Model Airplane Club* of Kansas City scheduled its second Annual Eleven-State Regional Meet under A.M.A. sanction, at Fairfax Field, Kansas City, Kans., with 6 flight circles on the West Apron to cover all classes in speed, stunt and scale, Jr., Sr. and open. (We hope to publish results in the next issue.)

New Jersey

The Bridgeton Whirlwinds are holding a Control Line Model Contest May 16 (rain date May 23) at Bridgeton Model Airport on So. E. Ave. This meet is A.M.A. sanctioned and over $400 in trophies and prizes will be awarded. The events will be Classes A, B, C & D, Speed,

It's NEW!
THE K & B
GLO TORP
Ready NOW!

$14.95
(less gas tank and ignition)



NEW K & B "SURE-STOP"
A positive fuel cut-off valve. Write for more information.

The "Glo-Torp," newest development by the manufacturers of the Famous K & B "TORPEDO," is now available at your hobby dealers. Featuring Glo-Plug ignition this new engine OPERATES WITHOUT COIL—CONDENSER OR TIMER. The "Glo-Torp" eliminates the extra weight of ignition accessories while providing maximum power for those *extra miles-per-hour*. Ask your dealer to tell you about the advantages of a K & B "GLO-TORP."

K & B MANUFACTURING COMPANY
6901 EASTERN AVENUE • BELL GARDENS, CALIFORNIA

X-CELL SPEED
THE FINEST, MOST COPIED MODEL AIRPLANE PROPELLER IN THE WORLD TODAY

DO NOT BE MISLED INTO BUYING AN INFERIOR COPY! INSIST UPON AN X-CELL MADE PROPELLER

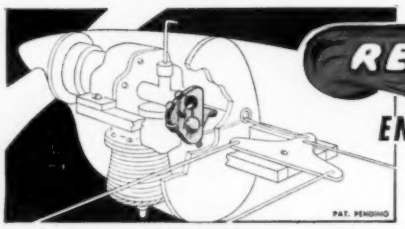
NEW "ARIEL CHAMP" PROP
The new line of X-CELL PROPELLERS
40¢ 40¢
8", 9", 10" and 11" diameter 8", 10" and 12" pitch

X-CELL SPEED, THE NEW CUSTOM LINE
60¢ 60¢
8", 9", 10" and 11" diameter 8", 10", 12" and 14" pitch

ALSO A CUSTOM THREE BLADED PROPELLER
8", 9", 10" and 11" diameter, 8" and 10" pitch, $1.45
Postage paid on all orders. No. C.O.D.'s.

X-CELL MANUFACTURING COMPANY
Wholesale orders only
6243 So. Manhattan Pl. Los Angeles 44, Calif.

Two Speed Flying Is Exciting



RED WING

ENGINE SPEED CONTROL

- ★ A two-speed unit complete in itself — weighs less than a half ounce.
- ★ Adaptable to many engines and may be installed in a few minutes.
- ★ Operates with a push-pull movement of your control handle.
- ★ Priced so that everyone can afford it.
- ★ Constructed to give you years of service.
- ★ Developed through thousands of test flights.
- ★ Operates equally well with regular ignition or glow plug.
- ★ Get the most out of control-line flying. Get a Red Wing Engine Speed Control.

DEALERS

Order from your jobber now. If he cannot supply you, write enclosing jobber's name.
Red Wing promotes control-line flying.

ATLANTIC AIRCRAFT INC.

213 WASHINGTON ST., WEST WARWICK, RHODE ISLAND

Junior and Open. The contest will run from 9:00 a.m. until 5:00 p.m.; registration closes at 2:00 p.m.

* *

The Irvington Prop Busters keep 'em flying every Sunday morning at Elastic Stop Nut field. Members, who specialize in U-control, are participating in a club contest which will close in April with 6 motors and 2 U-Reelys to be awarded the winners. The group is seeking a meeting place where they can build and repair models and motors; they plan to request a flying site in Irvington. The club has 20 members and recently elected the following officers: Pres. Vernon Aurnhammer; Vice Pres. John Hearn; Sec'y Henry A. Schumacher; Treas. Lee Bernhardt. Interested modelers may contact Henry A. Schumacher at 36 Elm Place, Irvington.

New York

The Screamin' Demons of Long Island announced plans for their Long Island invitational Championships. The club has already applied for A.M.A. sanction and the date set is July 18 (rain date July 25). The contest will consist of the following events: 1. Free Flight Gas, Classes A, B, C, D; 2. Free Flight Gas (Combined Classes, 10 Sec. engine run); 3. Towline Glider (Combined Classes); 4. Outdoor Rubber (Combined Classes); 5. Free Flight CO-2.

* *

The Long Island Model Flyers of Oceanside will hold their Second Annual Open U-Control Contest at the Freeport Municipal Stadium on June 20 (rain date June 27).

Further details have reached us regarding the *Prop Spinners* combined Radio Control and Payload contest to be held at Curtiss Field, L.I., on May 2. The Radio Control event will be run in 2 sections, with the multiple-channel control systems in a separate class; A.M.A. rules will be used. The Payload contest, in which the fliers will have 3 official flights, will be run on a new set of rules. The winner will be that plane which carries the most removable payload weight, per unit of engine displacement, and which has a 1 to 1 ratio between a specified engine run and the glide time. In other words, if the engine run is 40 sec. the plane that carries the most weight with the smallest engine and has a gliding time of at least 40 sec. will be the winner. Entry blanks should be sent in no later than April 2 to Bill Fletcher, 97-08 Grand Ave., Elmhurst, L.I.

* *

The Cloudhoppers Model Club of Flushing is interested in contacting all those in the neighboring areas who are interested in construction and flying of both control line and free flight models. Write Pres. William C. Kimbell, 36-14 165 St., Flushing.

Oregon

Here are results of the *Salem Cloud Chasers* Hand Launch Tourney held Jan. 18 at the YMCA gym. Winners were: 1. Earl Cayton; 2. Philip Keefer; 3. Jim Makinson.

Pennsylvania

The recently formed *Wyoming Valley Model Airplane Ass'n* elected the following officers: Pres. Ellsworth Sikaiski; Sec'y Edward Sikaiski; Treas. Charles Bauers, Sr. The club boasts an initial membership of 61—all U-control flyers.

On April 2, a model airplane exhibit and model auto races were scheduled at the Masonic Temple in Johnstown. Also, on June 27 (rain date July 18) a model airplane meet will be held in the Municipal Stadium. Both events are sponsored by the Johnstown Exchange Club.

Washington

Lt. Comm. M. W. Munk is sponsoring a model club at The Naval Air Station, whidbey Island.

Wisconsin

Thermal Dusters Model Aeroplane Club of Beloit, announces its Second Annual U-Control Contest to be held June 20. Events include speed, stunt, scale and jet classifications. The club hopes to offer a prize list including cash, trophies and merchandise of at least $1500. Club officers recently elected for the first 6 months of 1948 are: Pres. Thomas Garry; Vice Pres. James Hankins; Sec'y John H. Bort; Treas. Al Heim.

Canada

The Charette Aircraft Co. (designers of airmobiles) will sponsor its 1st International Annual Model Airmobile Contest in June at Carp, Ont. Mail all inquiries to Rene Charette, 213 Besserer St., Ottawa, Ona.

England

Following are the newly elected officers of *The Society Of Model Aeronautical Engineers*: Chairman A. F. Houlberg; Vice Chairman C. A. Rippon; Hon. Sec'y D. A. Gordon; Hon. Treas. L. J. Hawkins; Hon. Comp. Sec'y H. R. Turner; Hon. Tech. Sec'y G. W. W. Harris; Hon. Press Sec'y H. York; Hon. Records Officer C. S. Rushbrooke.

Philippine Islands

Julio G. Dumo furnishs us with results of the *Philippine National*: "Outdoor rubber powered model plane *Reyne*, owned by Air Scout Ricardo Paman of Davao, Mindanao flew 12 min. and 50 sec. to shatter all existing Philippine records on competitive model flights; it ran away with an easy first place in this division of the 3rd Boy Scout National Airplane Model Contest held last Dec. 13 at Grace Park airport in Manila. In the free flight division, motor powered plane *Butch* of Lone Scout Julian Dycaico (Pampanga, Luzon) flew 3 min. and 53 sec. to take first place. Dycaico, winner of last year's rubber powered model contest, took the field only once to win the event with his model. Other winners for rubber powered models were: Scout Jose Avelino of Manila, 2d place with flight time of 4 min., 36 sec.; 3rd place, Scout Norberto Dalapag of Cebu, 2 min. 20 sec. Prizes were presented to winners by Contest Director Hilarion Silayan of the Bureau of Plant Industry. 1st place winners each received a one-year scholarship donated by the FEATI Institute of Technology; 2nd place winners were awarded a one year scholarship donated by the Island Aviation School; 3rd place winners were given a half year scholarship in aviation mechanics donated by Fortunato Concepcion, a BSP (Boy Scout of the Philippines). As a contribution to the success of the Boy Scout Movement, contestants who came from different provinces were given free rides on board CALI planes through the courtesy of Commercial Airlines, Inc. a pioneer airline in the Islands."

STOP WATCHES

15-Jewel Elgins Sweep-Second Hands — Precision Movements 1-10 Second Timing

Ten Seconds Per Revolution of Sweep Hand

Sent Postpaid for Only **$9.95** Cost Gov't. $39.50

ORDER TODAY this precision movement ELGIN STOP WATCH which was used by Army Air Corps Navigators. Ideal for clocking your model's speed. Moneyback guarantee if not satisfied. Sorry, no C.O.D.'s.

BROPAR
DISTRIBUTORS
P. O. Box 275, Dept. 571
San Antonio 6, Texas

WHY SUFFER?

You Can Laugh While Learning!!!

AIRPLANE WEIGHT AND BALANCE MANUAL

Original, humorously written, complete, no "big" words, 16 drawings, 11 formulas

Very simplified, starts with necessary arithmetic; teaches moments, weighing procedure, C.G. calculations, ballasting methods, alteration systems, etc.

Each basic airplane balance problem explained and worked out in detail, step by step, easily understood by home study. Method and knowledge can be used on landplanes, seaplanes, models, any object.

Revised Edition of
"THE ELUSIVE SEEGEE CRITTER"
Erupted by John W. Herrick
Years of experience, practical engineer, mechanic, teacher

Postpaid in U.S. for $1.00 or sent C.O.D.

MERRYSTUDY PUBLICATIONS
Box H, LaFayette, N.Y.

New Torpedo Plane

Our June cover will feature the Grumman XTB3F-1; this carrier-based plane is unusual in several ways, not the least of which is that it is a single seater. Story and 3 views will be included as usual.

WIRE

WIRE CRAFT BRAND
(A Name to Remember)

Designed by trained metallurgists to fulfill the needs of your model hobbyists.

Carded Zinc Plated Wire Spooled Zinc Plated Strand
Carded Stainless Wire Spooled Stainless Strand
Spooled Zinc Plated Wire Carded Zinc Plated Strand
Spooled Stainless Wire Carded Stainless Strand

Control Horn Wire—Landing Gear Wire—Landing Gear Formed

All control lines mounted on color coded spools and cards individually cellophane wrapped.

OUR GUARANTEE.
1. Better sales appeal.
2. Spools sturdy enough for reuse.
3. Full satisfaction guaranteed.
4. Conformity to A.M.A. specification.
5. Generous discounts.

Jobbers and dealers write on letterhead for our complete catalogue.

SPECIALTY INQUIRIES SOLICITED

PITTSBURGH WIRE CRAFT CO.
911 Audrey Dr., R.D. No. 6, Pittsburgh, Pa.

Flash

(*Continued from page 2*)

ians continuing in production. New types to be built during the year include Grumman F9F *Panther*, Vought F6U *Pirate*, McDonnel F2H *Banshee*, and Martin P4M *Mercator* scheduled for completion during the year.

NEWS FROM ABROAD: First flights continue: the DeHavilland *Drover*, Australian designed and built tri-motor to replace the biplane *Dragon* transports; Short *Sealand*, comparable in purpose and appearance to Grumman *Mallard* executive transport; F.A.M.A., Argentine airline, has ordered 6 Douglas DC-6 transports; British will not produce the Vickers *Attacker* carrier version—a swept-wing version, the *Swift*, will be used as a research airplane; the second Avro *Athena* will also fly with a reciprocating engine as did the first, when both were supposed to use a turboprop engine; Italy is nearing completion on the first Breda *BZ-308* a 4 engine transport similar in appearance to Lockheed *Constellation*. Three are on order for Argentina and may be licensed for production in that country; Svensk *Aeroplan A.B.* will have the new *SAAB 29* sweptwing jet fighter flying this summer.

LATEST TO JOIN 4 place parade is Aeronca with its new *Sedan*, an all new design priced to sell at $4,795. This figure is lowest 1948 4 place price tag yet posted, and well under most others. The new *Sedan* follows closely the familiar *Champion* in line but features a completely redesigned tail and single-strut wing support. It is powered by the new *Continental* 145 hp engine. The new wing is of all metal construction, the fuselage and tail surfaces welded steel tubing fabric covered. Performance includes 112 mph cruising speed, rate-of-climb 650 ft. per min., and stall speed 53 mph. The new 4 placer has a gross weight of 2050 lbs. including 900 lbs. useful load. Standard equipment includes twin landing lights, starter, 12-volt generator and battery, hydraulic brakes, muffler, parking brake, ash trays and steerable tail wheel. Production deliveries are already under way at Middletown, O.

HOPPICOPTER FLIES! At long last the radical one-man "back pack" helicopter has completed preliminary test flights with Kermit D. Jones at the controls of the Pentecost-designed creation. The flights were made at Bow Lake Air Field, near Seattle, Wash. where the craft was built. Both Air Force and Naval Aviation observers witnessed the flights. Latest version of the *Hoppicopter* features a fixed tricycle landing gear, counter revolving rotors and engine mount aft of the seat.

FIRST FLIGHTS of Douglas D-558-II *Skyrocket* were successfully made at Muroc Air Force Base. The initial flights were at low speeds to determine airworthiness of the plane. Powered by a combination turbojet and rocket engine, the brilliantly painted swept-wing speedster is expected to surpass the sonic-flying Bell XS-1 by a considerable margin.

LATEST DEVELOPMENT IN THE unique Goodyear GA-2 *Duck* program (Nov. 1947 issue MODEL AIRPLANE NEWS) is the shipment of a *Duck* equipped with castering gear to Europe for service tests. Possibility of foreign purchasers perhaps loomed large in the decision. The *Duck* will be tried out on the lakes and inland waters of the British Isles as well as the Continent. Meanwhile, all domestic *Ducks* have completed their tests and returned to the Goodyear plant in Akron. Service test reports are now being studied to determine the future of the amphibian.

HERE'S YOUR CHANCE: War Assets Administration has one remaining Goodyear F2G-1 *Corsair* fighter left. Located at Bush Field, Augusta, Ga. it is similar to the plane piloted to first place in the Thompson Trophy Race by Cook Cleland last September. It is powered by a Pratt & Whitney *Wasp Major* of 3000 hp and is guaranteed to give you a 400 mph plus ride you'll never forget!

THE Mohawk Chief

NEVER BEFORE AN ENGINE LIKE THIS AT A PRICE SO LOW

$8.95 LESS COIL

Compare THESE QUALITY FEATURES WITH ENGINES COSTING TWICE AS MUCH • • •

One-piece steel cylinder for even heat flow • Deep cylinder fins for efficient cooling • Aluminum crankcase with strong mounting lugs • One-piece crankshaft, hardened and ground • Rotary valve for high performance • Impact fuel induction for high speed • One-piece steel piston, hardened and precision fitted to the cylinder • Aluminum connecting rod, heat treated • Adjustable timer, easily regulated • Precision needle valve for fine adjustment • Bakelite gas tank permits use of "hot" fuels • Gasoline tank mounted on crankcase • Large volume exhaust stack for rapid scavenging • Champion spark plug • Hardened propeller flanges • Replaceable propeller bolt.

SPECIFICATIONS
Displ. .299, B class
Bore .760 Stroke .660
R.P.M. 2,000 to 10,000
Wt. with tank 7 oz.

Every Engine BLOCK TESTED and GUARANTEED

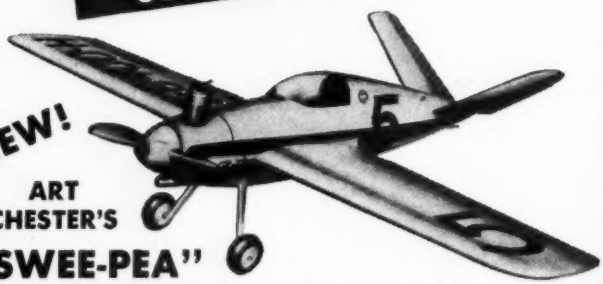
MOHAWK SPITFIRE COIL for top performance for any miniature motor. Produces intense spark, low battery drain. Complete with high tension lead . . . only $1.95.

See your local dealer or order direct from factory. Add 25c for handling. Or send only $1.00 and we will ship C.O.D. for balance.

MOHAWK ENGINEERING CO.
MOHAWK, NEW YORK

Berkeley

BRINGS YOU ANOTHER SENSATIONAL "U-CONTROL"* SCALE MODEL OF A "GOOD YEAR" TROPHY WINNER



NEW!

ART CHESTER'S

"SWEE-PEA"

25" WING SPAN For .09 to .36 Engines

The sensation of the National Air Races with its advance design and butterfly tail.

The model was designed with the personal cooperation of Art Chester, who flies this model himself.

* The kit is complete with printed out balsa parts, hardware, full color decals and detailed plans.

Sensationally low priced **$2.50**

"BUSTER"

24" WINGSPAN — For .19 to .36 Engines

1½" Scale Model of 1947 Goodyear Trophy at National Air Races. Complete Standard Kit.

$2.50

Hawker Super Fury

24" Wingspan ¾" scale. For .09 to .23 engines, with genuine "U" Control Elevator and "Autotrol" Rudder.

$2.50

The Whip-Power Model of the Year

P-84 "THUNDERJET"

Standard Jet Fighter of the U. S. Air Force

⅜" Scale, 13⅝" Wingspan, U-Control*, Whip-Power Solid with REAL TURBO-JET NOISEMAKER

Sounds just like the real thing!

Kit Includes:

- Carved Fuselage
- Cut Out Wing and Tail
- Plastic Bubble Canopy
- Complete Hardware
- Full Color Decals

Complete Kit $1.50

*Manufactured under license. Jim Walker U-Control Patent No. 2,292,416

LATEST 1948 CATALOG

Big 8½" x 11" Book, loose leaf bound, listing hundreds of model kits, supplies and accessories. New sheets mailed three times during the year. At your dealer or print your name and address and enclose $.25 in coin and mail to above address. **25¢**

MAIL ORDERS

If there is no model dealer in your community, mail orders will be filled by your regular mail order supplier, postpaid, or send order to Berkeley Model Supplies, 140 Greenpoint Avenue, Brooklyn 22, N. Y.

SOLD THRU

BERKELEY

DEALERS & DISTRIBUTORS

Index to ADVERTISERS in this Issue

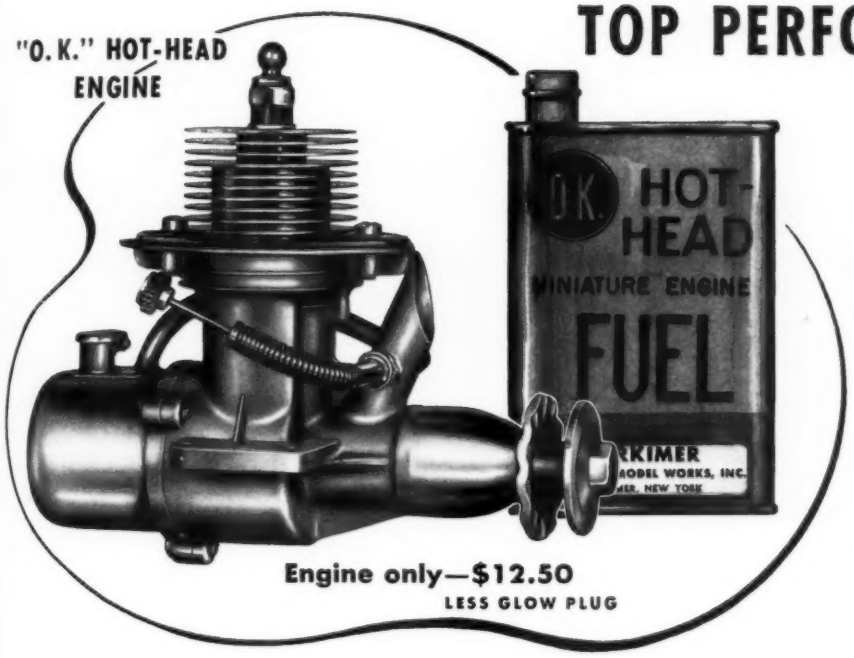
Ace Model Airplane Co. 1
Aeromarine Co. 46
Aero Spark Co. 60
America's Hobby Center 6, 7
American Hobby Specialties, Inc. 43
Mel Anderson Mfg. Co. 57
Atlantic Aircraft, Inc. 70
Atwood Mfg. Co. 62
Austin-Craft 65
B & D Racing Engine Laboratory 50
Banner Fireworks Mfg. Co., Inc. 67
Berkeley Models, Inc. 63, 72
Broadfield Air-Model Co. 56
Bropar Distributors 71
Cal-Aero Technical Institute 5
Campus Industries, Inc. 39
Carter Craft Models 38
Cleveland Model & Supply Co. 40
Consolidated Model Engineering Co. 66
L. M. Cox Mfg. Co. 61
Crescent Model Shop 37
deBolt Model Engineering Co. 60
Del Aero Research Laboratory, Inc. 63
Dooling Brothers 38
Douglas Model Distributors 35
Drone Engineering Co. 58
Duro-Matic Products Co. 45
Dyna-Model Products Co. 44
Eastern Supply Co. 54
Electric Miniatures 56
Experiment, Inc. 52
Fischer's Hobby Service 42
Forster Brothers 46
Four Star Model Builders Supply 59
Francisco Laboratories 65
Froom Manufacturing Co. 38
G.H.Q. Motors 64
GMCO Modelcraft Hobbies 55
Gotham Hobby Co. 67
H & H Model Motor Co. 66
Herkimer Tool & Model Works, Inc. ..... 3rd Cover & pg. 58
Hinkel Hobby Specialties 50
Hobbycrafts 56
Holcomb Gas Model Shop 65
K & B Mfg. Co. 69
Kramer Brothers Model Distributors 54
Lansco Model Aircraft 63
Leader Model Supply Co. 48
Lucas & Smith Mfg. Co. 36
Master Modelcraft 67
Megow 34
Mercury Model Airplane Co. 57
Merrystudy Publications 71
Micro-Bilt, Inc. 49
Micro-Diesel Co. 47
Minnesota Engine Works 47
Don S. Mitchell Co. 39
Mite Distributing Co. 51
Modelcraft 62
Mod-Kraft Co. 58
Mohawk Engineering Co. 71
Monogram Models, Inc. 68
National Model Distributors 51
Nawell 67
Northrop Aeronautical Institute 33
Ohlsson & Rice, Inc. ..... Back Cover & pg. 3
Phantom Motors Distributing Co. 43
Pierce Industries 53
Pittsburgh Wire Craft Co. 71
Reggie Pink, Inc. 52
Rite Flite Specialties 54
Bob Roberts 44
Ross Chemical Co. 65
Scientific Model Airplane Co. 50
Scranton Hobby Center 48
Selley Mfg. Co. 42
Sky Hobby, Inc. 48
Skyway Modelcraft, Inc. 41
Claude C. Slate Co. 68
Nathan R. Smith Mfg. Co. 64
Sparky Specialties, Inc. 42
J. Spokane & Co., Inc. 42
Victor Stanzel & Co. 8
Sterling Models 63
Streed Electric Co. 50
Super Cyclone, Inc. 4
Testor Chemical Co. ..... 2d Cover
Tiger Products Co. 60
Trost 52
R. L. Webber 52
Western Model Distributors 64
Whittler's Craft 44
X-Acto Crescent Products Co. 48
X-Cell Mfg. Co. 69

No responsibility assumed for any omission or error.

May 1948

MODEL AIRPLANE NEWS

MATCH-MATES FOR TOP PERFORMANCE



The PERFECT COMBINATION *for* FAST STARTS *and* HIGHEST SPEEDS

What a team they make!

The sensational, new "O. K." Hot-Head engine has already set new performance standards for Glow Plug operation. Now, even greater records are in the making with the introduction of "O. K." Hot-Head Miniature Engine Fuel, expressly formulated to bring out the best in the new Hot-Head engine.

Developed in the "O. K." laboratories, the new fuel is the result of more than two hundred individual performance tests. The finished formula was found to produce *substantially* more power than any other fuel intended for Glow Plug operation. So, if you want the best in performance — insist on these great power partners.

Not a conversion model but a completely new design, the "O. K." Hot-Head engine is built to take the unusual stresses peculiar to Glow Plug operation. It features an extra heavy crankshaft .406" in diameter, a drop forged, heat-treated connecting rod and a bronze main bearing, 1⅝" long.

Don't take a chance of ruining your present conventional ignition type engine by conversion as the average engine of this type will not perform satisfactorily nor is it built strong enough for Glow Plug.

The "O. K." Hot-Head is so simple to operate that all you have to do is connect a 1½ volt battery to the Glow Plug until the engine starts. The battery is then disconnected immediately and the engine will continue to run on pre-ignition firing.

The Glow Plug itself can be purchased at your favorite hobby shop for 85c.

ENGINE SPECIFICATIONS

DISPLACEMENT — .299, B CLASS	BORE — .760
R. P. M. — (WITH HOT-HEAD FUEL ONLY)	TO 11,000
STROKE — .660	WEIGHT — 7 OUNCES

HERKIMER Tool and Model Works, Inc., Herkimer, N.Y.
CANADA: Herkimer "OK" Engine Co., 511 Hermant Bldg., Toronto
EXPORT: 120 Wall St., New York 5 (All Cables) Concordia, N. Y.

Not just a PLUG — Not just FUEL — Not just a ROTARY VALVE — but

THE PERFECT TEAM

for Modern Model Flying

Ohlsson & Rice Fuel No. 1 for Standard Ignition.

Ohlsson & Rice Fuel No. 2 for Glow Plug Operation.

Designed for peak performance with Ohlsson & Rice engines but will give excellent results with many other engines.

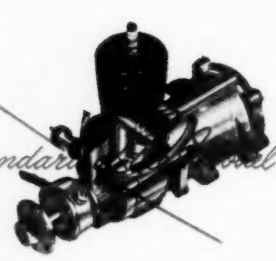
PINTS 75c
QUARTS ..$1.40

New Improved O & R Glow-Plug

Its "platinum heart" gives extra strength and heat balance. Draws less amperage, thus prolonging life of starting batteries. Designed specifically for use in O & R engines, but will also operate most Class A and B engines.

85c ea.

Ohlsson & Rice now offers the model world not just one or two elements for increased engine performance, but a perfected power team. A *pow-OR* team, composed of the right glow-plug for the right fuel for the right engine. Each unit of this new O & R *pow-OR* team has been developed by the world's largest model engine manufacturers to provide the *teamwork essential* for proper combustion and lubrication at today's high speeds. With this team, present owners of O & R 19 or 23 can get more fun from their model flying with more speed and more power, more time in the air, less time on the ground. See your dealer today and equip your engine with the new Ohlsson & Rice *pow-OR teamwork*.



Standard [illegible] World

Ohlsson & Rice

EMERY AT GRANDE VISTA • LOS ANGELES 23, CALIFORNIA